

# hp-ux/usr

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## HP-UX Network Time Synchronization Developing Client-Server Applications with HP Distributed Smalltalk Part I Using Glance Effectively

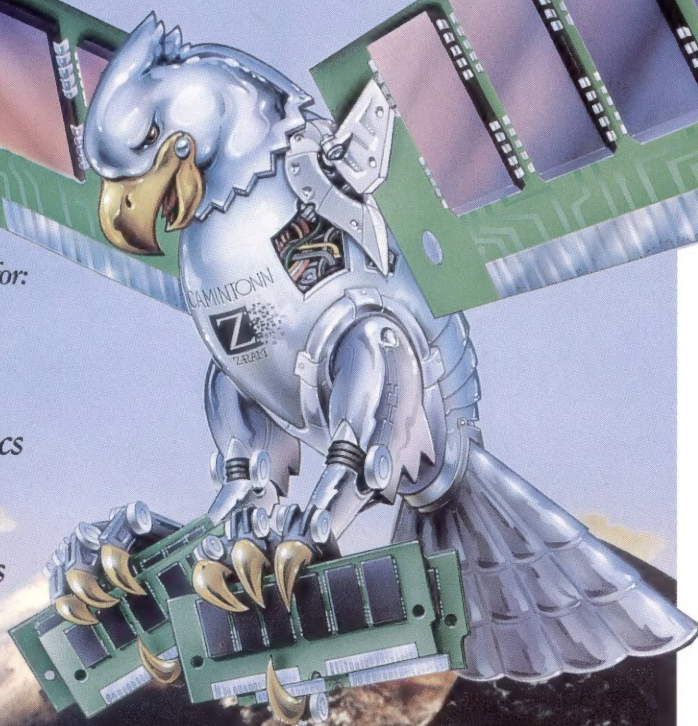
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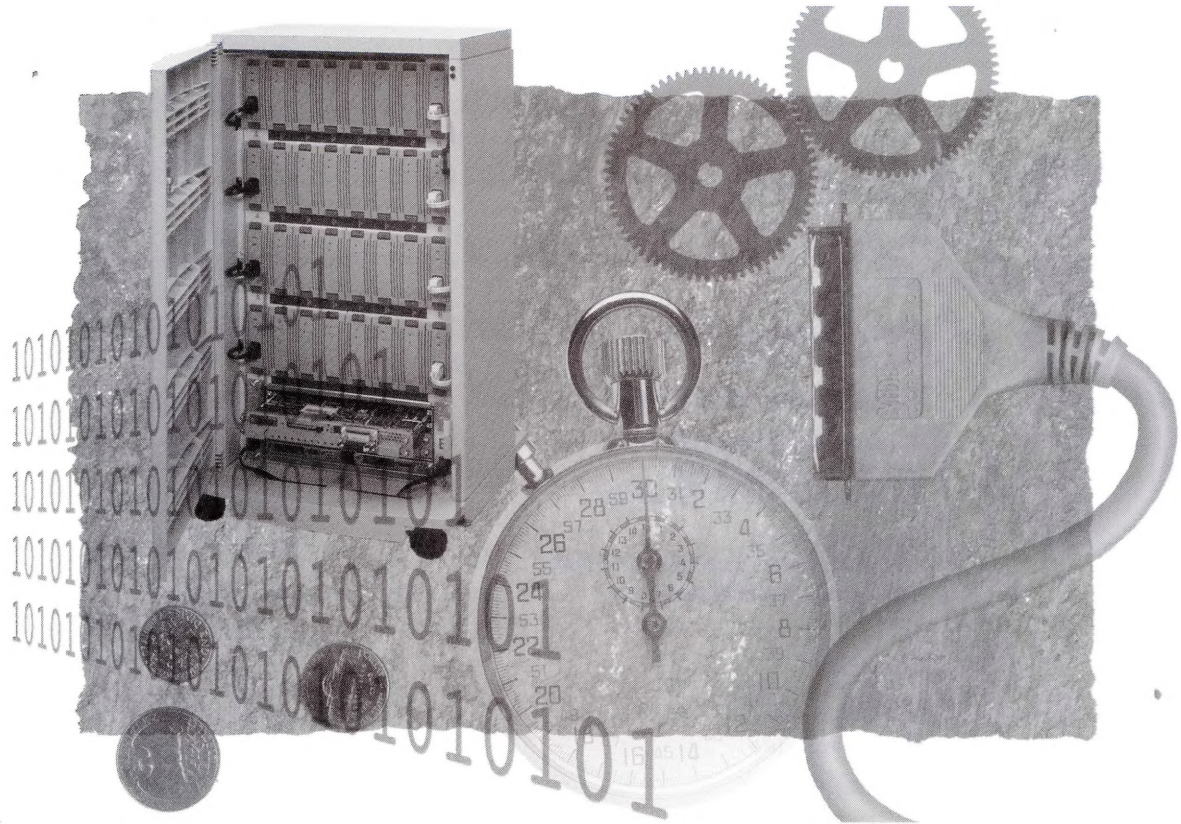
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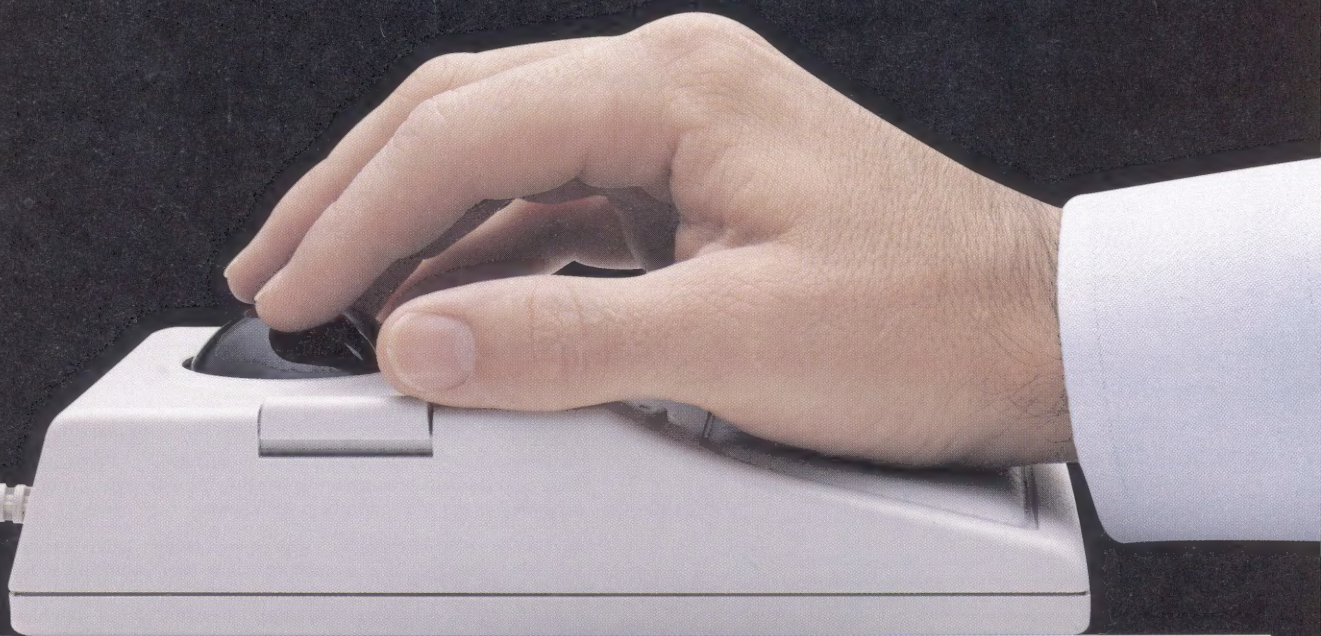
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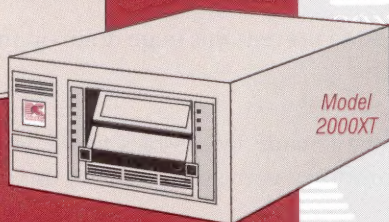
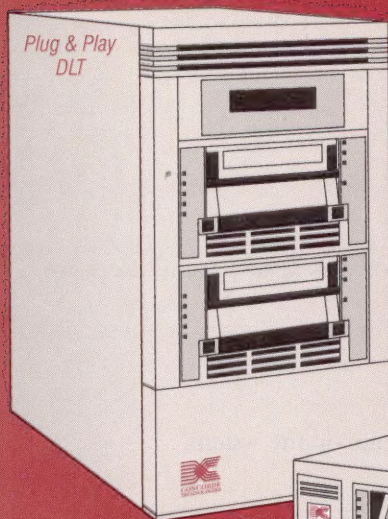
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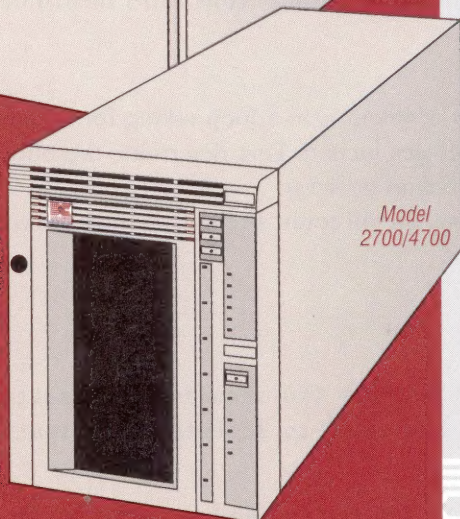
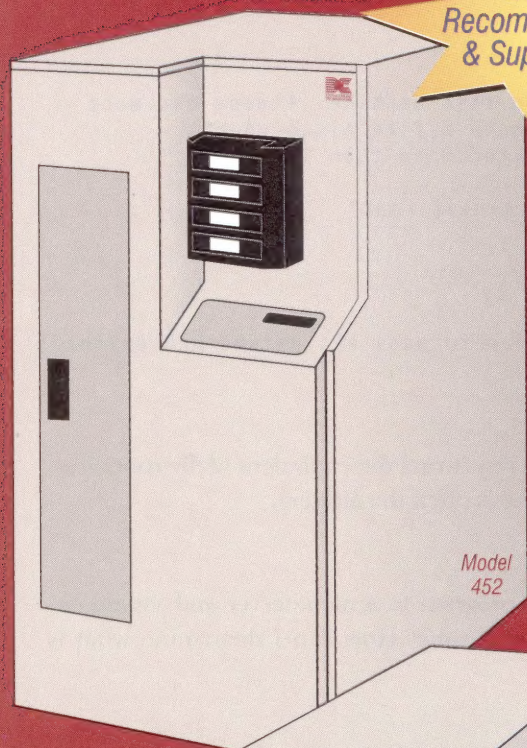
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# Question & Answer

**Q:** I have a large system with many gigabytes of disk space. Some users are trying to find files with the command:

```
find /
```

Is there something I can do to prevent this huge drain on the system?

**A:** This is a common error made by newbies to the world of HP-UX. Other than strict education of individual users, you could try this simple script:

```
#!/bin/sh
#
# Fixup for find /
#
if [ "$1" = "/" ]
then
    echo
    echo "find / is not allowed on this machine. Please use more
    echo "efficient methods to locate a file since your"
    echo "command would have affected more than 175 users."
    echo
    echo "    Thanks. Questions? e-mail root"
    echo
    exit 1
fi
#
# Use the standard $@ incantation to pass all params unblemished
#
exec /bin/find.real ${@+"$@"}
```

Note that power users will figure out ways to get the equivalent of the root directory, but this will fix the casual user (who is often the abuser).

**Q:** My system is running the *named* program as a nameserver and sometimes *named* consumes enormous amounts of time. How can I determine what is happening?

**A:** Usually this indicates that a system is in a loop asking for a name lookup dozens, even hundreds of times per second. First determine the offender (i.e., the system(s) asking for name lookup services).

This simple script called *namedstat* will count and sort the nameserver requests in a short period:

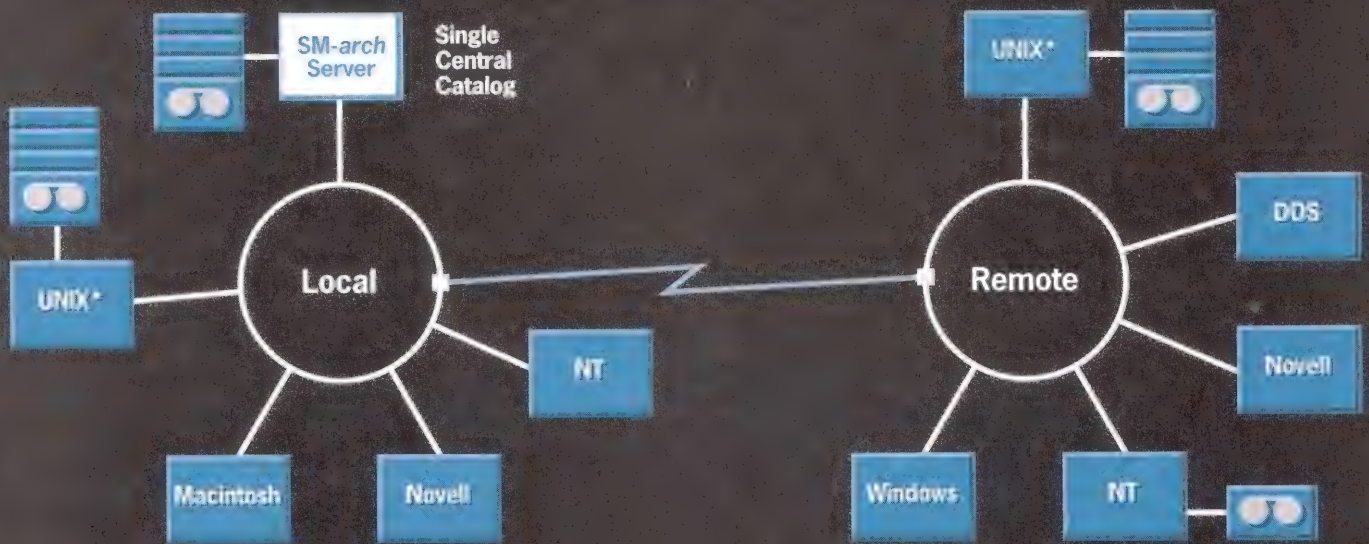
```
#!/bin/sh
#
# Ask named to capture $1 seconds (10 seconds by default) of DNS
# requests and then call scannamed to analyze the output. Works
```



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```

# for both 10.xx as well as earlier systems.
#
MYREV=`uname -r | /usr/bin/cut -f 2 -d .`
if [ $MYREV -lt 10 ]
then
    NAMEDdir=/usr/tmp
else
    NAMEDdir=/var/tmp
fi
#
# Check if user supplied a sleep time
#
if [ "$1" = "" ]
then
    myWAIT=10
else
    myWAIT=$1
fi
#
# Now start the trace
#
echo "Starting named trace level 1...sleep for $myWAIT seconds"
echo
sig_named debug 1
sleep $myWAIT
sig_named debug 0
echo
#
# AWK command to read $NAMEDdir/named.run logfile and extract
# the nslookups and gethostbyname calls
#
/usr/bin/awk '
BEGIN {
    start = 0 ;
}
$1 == "datagram" {
    start = 1
    lookup = $3
    from[lookup] = lookup
    fromcount[lookup] += 1
}
$1 == "req:" && start == 1 {
    start = 2
    pos1 = index($2,"(") + 1
    pos2 = index($2,")")

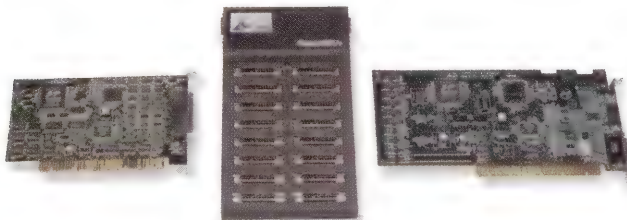
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```

        name = substr($2,pos1,pos2-pos1);
        next
    }
$1 == "req:" && start == 2 {
    start = 3
    next
}
$1 == "req:" && start == 3 {
    start = 0
    id = $4
}
END {
    for ( i in from )
        printf(" From address %s = %d\n",
            from[i],fromcount[i]);
}
' $NAMEDdir/named.run | sort -nrk 5

```

Output from the program would look like:

```

Starting named trace level 1...sleep for 10 seconds
Name server set at debug level 1.
Debug output is in /usr/tmp/named.run
Debug turned off.
From address 151.19.184.24 = 57
From address 152.97.184.29 = 16
From address 150.4.152.7 = 6
From address 152.17.186.96 = 4
From address 151.10.216.25 = 4
From address 150.24.240.5 = 3
From address 152.13.48.11 = 3
From address 150.10.88.8 = 3
From address 152.1.200.2 = 3
From address 151.7.240.32 = 2
From address 150.6.184.40 = 2
From address 152.46.233.37 = 2
From address 150.43.40.31 = 2
From address 151.36.88.4 = 2

```

In the above situation, the machine 151.19.184.24 asked for a name lookup 57 times during the 10 second run... perhaps a bit too high. The next step is to determine which name/address is being requested. For this, use the command:

```

cd /var/tmp (or cd /usr/tmp for pre-10.xx systems)
grep nlookup named.run

```

**Q:** Can I remove the *lost+found* directory?

**A:** *lost+found* is automatically created by *newfs(1m)* and is the location where file system repair takes place. If a file or directory becomes disconnected from the inode pointing to the data, the program *fsck(1m)* will attempt to rescue the file by creating a directory entry in the *lost+found* directory and reconnecting the lost data area with this entry.

Be sure that every read-write file system mounted to your op system has a *lost+found* directory. Without this directory, recovery of lost files (not deleted files) is very difficult. *fsck(1m)* cannot fix a file system with lost inodes without a *lost+found* directory.

Since the original name of the file has been lost, *fsck(1m)* will use the inode number as a substitute name, and to prevent accidental removal of the file, the new name is preceded by a # character as in #13523. If you try to remove the file, the # character is interpreted by the shell as the beginning of a comment. To really remove the file, you must escape the shell's special meaning for # with a backslash \ as in:

```
rm /lost+found/\#13523
```

However, these files do represent data recovered after an improper shutdown, so deletion is not always the best choice. The steps needed to recover these files are:

1. Determine if there are any files in any *lost+found* directories throughout the mounted file systems.
2. For each file, determine the type of file, contents, and perhaps the



original name and location for the file. The tools are:

- a. Use the `ll` command to see the size, permissions and ownership of the files. If the entry is a directory, use the `ll` command to list the files inside the directory:

```
ll /lost+found/\#13523/*
```

If the directory has recognizable files, try to determine what the original names might have been. If you have a backup tape handy, make a listing of all the file names and use `grep` to search through the list looking for the files found above.

- b. For individual files, determine the file type with the `file(1)` command. This is not foolproof but will reveal executable binary files, shell scripts, ASCII files, etc.
- c. For ASCII files, list the contents. However, to prevent special characters from resetting your terminal, use the `-v` option to the `cat` command as in:

```
cat -v /lost+found/\#13523 | more
```

Once you see the contents, you may be able to determine the original file's name. Ask other users if they recognize the file. Once you get a name, just use the `mv(1)` command to rename and move the file as in:

```
mv /lost+found/\#13523 /users/root/myfile
```

- d. For binary files, if they are executable programs, use the `strings(1)` command to look at ASCII strings in the program. Often, a program will have a string of characters internally that will print the name of the program or perhaps help data that will aid in seeing the function and perhaps the name of the program. For pure binary files (such as readings from instruments), it may not be possible to guess the correct file name, although date, time, and size may be helpful.

Finally, the *lost+found* directory should have empty entries in it since *fsck(1m)* needs to use existing empty slots to reconnect lost inodes. If the *lost+found* directory is not large enough (i.e., from the `ll -d` command), copy a dozen files or so into the *lost+found* directory, then remove them. This will increase

the empty slots in the *lost+found* directory.

In conclusion, the *lost+found* directory is critical to the successful recovery of lost files after an improper shutdown. While you can bypass *fsck*'s check of the file system by force-mounting a corrupt file system, you risk a system panic if the corruption is severe. When running *fsck(1m)* to fix a file system, if you say no to the "Reconnect" question, then the file system will not be marked clean. However, if you allow *fsck* to fix all other areas of corruption, force mounting a file system after this task is fairly safe. ■

---

*Questions are answered by Bill Hassell, an HP-UX System Support engineer at the Hewlett-Packard Response Center in Atlanta, Georgia. He can be reached by e-mail at [blh@hpuerca.atl.hp.com](mailto:blh@hpuerca.atl.hp.com).*



## File System Recover

IN THE PAST YEAR I have helped a surprising number of my customers recover from either total disk failures or corrupted file systems.

In most cases the customer was able to install a new disk or, luckily, recover a file system using *fsck*. Only in one case was a complete reload of HP-UX and then restoration of backups necessary. In this column I will describe how HP-UX handles file systems and provide some tips and tricks to help you recover your system in the result of a failure.

### ***Backups, Backups, Backups***

The first step in making sure you can recover from a disk or file system failure is to have valid backups. Unless nothing important changes on your system, daily backups are essential. Backups alone can cover a whole column so I'll just recommend you implement a backup scheme and stick with it! It also doesn't hurt to verify the tapes every once in a while to make sure they are still OK.

### ***HP-UX File Systems***

There are two types of HP-UX file systems that you need to manage: Logical Volumes and Disk Sections. Disk sections are the easiest to understand: your physical disk is divided into multiple sections, each of a fixed size. You cannot change the size of any of the sections, but you can combine them to create a single file system or swap area.

Logical Volumes are a different approach. If you use Logical Volumes, you can create file systems and swap areas of any size and include multiple disks in the file system. Logical volumes first became widely used with HP-UX 9.0 and were available only on the Series 800. HP-UX 10.0 extends Logical

Volumes to the Series 700 also.

From the user's perspective, Logical Volumes and Disk Sections look the same. However, the file systems from Disk Sections look odd-sized—for example 105 MB instead of 100. You also may have to create a very small file system with the remains of your disk after creating swap and primary file systems using Disk Sections.

### ***Superblocks***

I won't go into the specifics of how the HP-UX file systems are implemented, but there are a couple of critical concepts a system administrator must understand: superblocks, inodes, and LVM configurations.

A superblock contains information about the status of a file system. The information in a superblock is updated when the system executes a sync command or the file system is unmounted. A superblock contains the locations of the inodes for the file system and the locations of any free space on the disk.

There is a primary superblock, which is what the kernel looks for when a file system is mounted. Since the superblock is so critical, copies of the superblock are stored elsewhere in the file system. This way, if the disk block where the superblock resides is lost, it is possible to find another disk block with a superblock and, with luck, most of the file system can be recovered.

The list of all superblock locations is stored in */etc/sbtab*.

### ***Inodes***

Inodes contain the actual location of files in a file system on disk. Depending on the size of the file, an inode might point to additional inodes for other parts



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of the file. Losing inodes can lead to loss of part or all of a file.

### Logical Volume Manager (LVM) Configuration

The LVM system is a layer on top of the raw HP-UX file system. LVM still uses inodes and superblocks but hides the direct superblock and inode access from the kernel. This allows LVM to use multiple disks as one file system since the kernel doesn't know it is referencing multiple superblocks.

The configuration for LVM is stored in the `/etc/lvmtab` file.

### Backing Up the Superblock and LVM Configurations

Since the Superblock and LVM configurations are so critical to being able to recover a corrupted file system or disk, it is important to back them up. The first step is to print `/etc/sftab` and store the contents in a safe place. Next copy `/etc/sftab` to a safe directory on another system or to tape. This way, if the root file system is corrupted, you can access the information to restore its superblocks and then the mounted file systems.

Backing up the LVM configuration is a little trickier since the LVM configuration is in binary. Also you must explicitly back up the configuration of each volume group. The command to back up the configuration is `vgcfgbackup`. The script I use to back up my LVM configuration is:

```
#!/bin/sh
/etc/vgcfgbackup /dev/vg00 > /dev/null
/etc/vgcfgbackup /dev/vg01 > /dev/null
/etc/vgcfgbackup /dev/vg02 > /dev/null
/etc/vgcfgbackup /dev/vg03 > /dev/null
/etc/vgcfgbackup /dev/vg04 > /dev/null
/etc/vgcfgbackup /dev/vg05 > /dev/null
```

This script copies the volume group configuration for all my groups to `/etc/lvmconf`. I then back up these files every night. This script runs before my backup script and must be completed before the backup script can start.

### Restoring Superblock Information

If the root file system is lost or corrupted, it is recommended not to restore the `/etc/sftab` file over the one created when you reinstalled. The reason is that the location of the superblock may have changed when you installed the new file system. After installing the new file system, use the printout of the `/etc/sftab` file to `fsck` the other file systems. Use the `-b fsck` option and the first number in the file for the file system you

want to `fsck`. `fsck` will then rebuild the entry in `/etc/sftab` for the file system you specified.

If the file is only corrupted or has been deleted, restore the file from your backups.

The file contains all the alternative superblock locations for your file systems. After restoring the file, try to `fsck` the missing or damaged file systems or reboot the system and let the boot process handle it.

### Restoring LVM configurations

Once the superblocks are restored, you need to restore the `/etc/lvmtab` file. If the `lvmtab` file is only corrupted or lost, use the `/etc/lgscan` utility. If the active LVM configuration is corrupted, use the `/etc/vgcfgrestore` command to restore the configuration.

Any time you have changed the disk or LVM configuration, you must back up the configuration files by printing the superblock `/etc/sftab` file and running the `/etc/vgcfgbackup` program.

### lost+found Directories

The superblock and LVM configuration steps I described above are for recovering from extreme damage. More likely than a disk failure or file system corruption is a system's losing power or not being cleanly shut down. When this happens, you have a pretty good chance of the boot-time `fsck` finding corrupted files.

When `fsck` finds corrupted files, it tries to place them in a directory named `lost+found` on the file system where the corrupted file was originally located. This `lost+found` directory is special in that it is deliberately sized to have free inodes. Most of the time, when a directory is created it has only two inodes, one each for the `.` and `..` directories.

HP-UX comes with the script `mklost+found`, which will create a `lost+found` directory in the current directory and then add the inodes. Every file system must have a `lost+found` directory for `fsck` to have someplace to place the newly 'recovered' files.

When `fsck` creates a file in `lost+found`, it cannot know what its name is so it assigns it a unique eight-character name. So how do you determine what file is in `lost+found` and who owns it? Sometimes `fsck` can determine the owner of the file, but most of the time you have to dig around a little.

First I try using the `file(1)` command on the file. Then if the `file` command doesn't help me, I try editing the file. If the `file` command did help, I use the tools for the program that created the file to determine what it is. For example, if the `file`

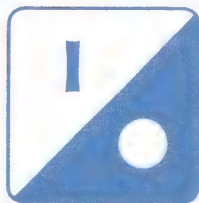


command said it was a *cpio* archive, I might use *nm(1)* or the *-l* option of the *cpio* command to see its contents.

#### */usr/preserve*

The *vi* editor is very good at keeping temporary copies of files you are editing in */tmp*. When the system is rebooted, deliberately or not, the boot sequence looks at */tmp* to see if there are any files that were being edited by *vi* at the time of the failure. If so, it copies the files into */usr/preserve* and sends e-mail to the user who was editing the file explaining how to recover it.

Many other applications provide a similar feature to the *vi* recovery system. Check your manuals to see what your favorite applications use. ■



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by David L. Totsch

## Pet HP-UX Tricks

RECENTLY I HAVE HAD several occasions to leverage the capabilities and flexibility of HP-UX utilities to my advantage (i.e., reduce the typing I have to do and thereby quickly reduce my workload). One of them involved a multiple file edit; another required converting some data; and a final one called for joining some lines in a file. Even though the sheer volume of a task does not provoke you to automate it, consider such issues as accuracy, the ability to replicate the task, and the need to back out the change.

If you have been around an HP-UX system for long, the need to perform the same edit on multiple files has risen. This usually comes in the form of a *sed* used to do a global substitution. My problem was just a bit more involved, but not much: I needed to drop an extra line into a file (of course, it couldn't be at the end of the file; it had to be inserted after the fifth line of the file). To illustrate the task, here is similar code that will put the courtesy loader reference into a group of shell scripts. I have omitted the routine task of getting the list of files and looping through it.

```
cp ${FILE} ${FILE}.OLD ##### Keep a copy!
sed -e "1 i\\
#!/bin/sh" ${FILE}.OLD > ${FILE}
```

If you are going to use an edit file (a file that contains the *sed* script), you need to omit one of the back-slashes.

The next task involved editing some raw data. Your system auditors should love this one. The file contained nice, regular, comma-separated fields of numbers. The only problem was that the third column of numbers ended with a character (a left curly-brace or A-I). Those characters needed to be translated into numbers (0-9). Here are a few lines of the troublesome data:

```
12345,678,0000044328{,98765
345,68,0000044328A,123345
12345,679,0000044328C,8234748
2212345,6444478,0000044328I,028347438
```

Troublesome indeed! Imagine changing about 23,000 rows. If you look closely, you can tell that the last character of the third field is not numeric. Here is the brute-force *sed* script that I used to change the data:

```
s/^\(.*\,.*\,.*\)[{]\(,.*\)/\10\2/
s/^\(.*\,.*\,.*\)[A]\(,.*\)/\11\2/
s/^\(.*\,.*\,.*\)[B]\(,.*\)/\12\2/
s/^\(.*\,.*\,.*\)[C]\(,.*\)/\13\2/
s/^\(.*\,.*\,.*\)[D]\(,.*\)/\14\2/
s/^\(.*\,.*\,.*\)[E]\(,.*\)/\15\2/
s/^\(.*\,.*\,.*\)[F]\(,.*\)/\16\2/
s/^\(.*\,.*\,.*\)[G]\(,.*\)/\17\2/
s/^\(.*\,.*\,.*\)[H]\(,.*\)/\18\2/
s/^\(.*\,.*\,.*\)[I]\(,.*\)/\19\2/
```



The above script performs a substitution, but not a common, everyday sort of substitution. There are two pairs of escaped parentheses “\(\)” in each substitution. Those parentheses mark sub-expressions that you can recall. These sub-expressions number them from left to right beginning at one. In the output portion of the substitution you see escaped numbers (\1 and \2). These tell *sed* to output what was matched into the first and second sub-expressions. The first sub-expression matches the first three columns of data up to the character we are interested in. I placed that character into a character class for readability. The second sub-expression matches everything else on the line from the comma to the end. Here is the output of the *sed* (data is in the file *bad\_data* and the *sed* script is in the file *cvt.sed*):

```
sed -f cvt.sed bad_data
12345,678,00000443280,98765
345,68,00000443281,123345
12345,679,00000443283,8234748
2345,680,00000443281,12
2212345,6444478,00000443289,028347438
12345,001,000527665,29470192
```

Not bad for a couple of minutes testing the *sed* script. You can use the sub-expression notation anywhere regular expressions are understood. Be sure to read the man page on *regexp*(5).

The last task I was faced with required that certain lines of data be joined. *awk* handles multiline records very well, but I didn't have the time to fuss over a long *awk* program.

Here is the example data:

```
12345      A
xky  65432

22763      B
ajf  78263

54121      K
meq  90257

42875      t vvw 98423
13214      B
utk  97452
```

Note that the lines with a lowercase letter in the second

field meet the specification. The requirement came in like this: “Join any line following one ending with an uppercase letter with the preceding line. Oh, while you are at it, remove all of those blank lines.”

No problem. I ran *vi* on the file and issued the command `:g/[A-Z]$/j`. That call to *ex* identifies lines that end in an uppercase letter and runs the join command. The next command I ran was `:g/^[[:space:]]*$/d`, which requests *ex* to run delete on any lines that are essentially blank. The collating sequence `[[:space:]]` matches spaces, tabs, and the like, which is modified by the asterisk (\*) to match zero or more occurrences.

Here is the example data after using those two commands:

```
12345      A xky  65432
22763      B ajf  78263
54121      K meq  90257
42875      t vvw 98423
13214      B utk  97452
```

Some days the system rises up and takes a bite out of you. Other days you are able to redirect the power of the beast and subdue it. Under most circumstances, you just have to dedicate slightly more think-time to reduce your action-time. Many times, thinking before doing will keep you out of trouble. One way to ensure the think-time is to try to automate the task—that is the mode where you naturally begin thinking about the implications of the change you will make, the ability to reverse that change, and defining more precisely the change you are about to make. ■

---

*After serving several different organizations over the past eight years as a system administrator with various flavors of UNIX, David L. Totsch still enjoys the profession. He also enjoys discussing UNIX with just about anyone. At present, he is working with HP-UX systems and wide-area networks for a Fortune 100 company in the Piedmont area of North Carolina. He can be reached via Internet: dtotsch@wfu.edu.*



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# HP-UX Network Time Synchronization



**D**oes anyone really know what time it is? Does anyone really care? In client-server computing environments, often one does care. When processors access files over NFS mounts, the timestamps on the files reflect the clocks on the remote clients. Applications that depend on time order, such as the *make* utility, can be affected. But the hardware clock in the average workstation is really a poor timekeeper. It is typically an uncompensated crystal oscillator with a rate that speeds up and slows down throughout the day in response to office temperature changes. With a frequency stability of only 0.01 percent, the hardware clock can gain or lose 10 seconds per day. What is needed is a means of putting system clocks into agreement, both in starting time and in frequency.

NTP, the Network Time Protocol, is a system of “architectures, algorithms, entities, and protocols” for the synchronization of UNIX and non-UNIX hosts over local and wide area networks and (optionally) over local buses. NTP is designed to transfer time from primary servers to clients over the Internet. It cross-checks system

clocks and tries to mitigate errors caused by loss of systems or entire networks. NTP has been ported to most vendor platforms, and is bundled in HP-UX Release 10.0 for Series 700/800 and HP-UX Release 9.10 for Series 300/400. Dennis Ferguson is the original author of NTP. David Mills is the author of Network Working Group RFC-1305, the complete specification of the NTP implementation.

## Controlling the System Clock

UNIX system time keeping is refer-



by Richard E. Schmidt

enced to a kernel-resident "software clock." At bootup the software clock knows how many machine cycles occur in, say, 10 milliseconds of real time. One hundred times per second, the hardware clock counts up to that number of cycles and generates an interrupt that updates the software system clock. In free-running mode, the amount of time added at each interrupt is contained in the kernel variable *tick*. A second kernel variable, *tickadj*, allows the system clock to run at two additional rates. At each interrupt the software clock can be incremented by  $(tick + tickadj)$  milliseconds to speed up the clock, or by  $(tick - tickadj)$  milliseconds to slow it down. This slewing of the clock is done very gradually to avoid abrupt jumps in time (HP-UX *tickadj* has a value of about 5 microseconds). By this method the system clock never runs backwards.

The *adjtime(2)* system call is used by NTP to control the UNIX system clock. (Release 2.1 of HP-RT, the real-time operating system for the 743i and 748i, also includes *adjtime(2)*.)

An NTP synchronization subnet consists of a number of hosts that query time from networked time servers (or peers), and that redistribute time to hosts at lower levels (strata) in the hierarchy of timekeepers. Typically, the top stratum (stratum 1, or primary servers) is populated with hosts with bus or serial interfaces to reliable sources of time. These sources can be radio clocks, GPS satellite timing receivers, or even atomic clocks. Stratum 2 servers might be campus

servers that obtain time from several primary servers over the Internet in order to relay time to their own local clients. The stratum 2 servers may be configured to peer with each other, comparing clocks and coming to a consensus on a synchronized time value.

NTP operates well over the unpredictable paths of the packet-switched Internet, because NTP makes robust estimates of three key variables in the relationship between a client host and a timeserver. *Network delay* is an estimate of how long it takes to get packets across the network. *Dispersion* of packet exchanges measures the repeatability of network delay times. A large dispersion affects estimation of the third variable, which is the correction that should be applied to a client's clock to bring it into agreement with its servers. When an NTP client sends a request for time to a server, the client timestamps the packet with the time of departure. The server timestamps the packet when it arrives in its "in basket," and again when it leaves the server's "out basket." When the client receives the packet in return, a fourth timestamp is written. From these timestamps the values of delay, offset, and dispersion are found.

The public NTP distribution includes configuration support and drivers for a number of external clock devices, including GPS satellite receivers, WWV radio timecode receivers, IRIG-b interfaces, and others that can be compiled into *xntpd*, the NTP daemon. There are even drivers for the NIST ACTS and Naval Observatory modem time services. (The *xntpd* provided with HP-UX 10.0

supports only the Spectracom Netclock/2 WWVB serial interface radio clock.) Included in the standard distribution are the control and inquiry programs *xntpd* and *ntpq*, a *traceroute*-like utility, *ntptrace*, and an *rdatel*-like utility, *ntpdate*, which uses NTP packets to set system time to that of a server.

### Obtaining NTP

With HP-UX 10.0 *sam* can be used to configure NTP. Click on the new "Time" icon and bring up "NTP Network Time Sources." *sam* configures the files */etc/ntp.conf* and */etc/ntp.keys*, and starts and stops the program */usr/sbin/xntpd*. (In HP-UX 9.10, you must manually configure the files in */usr/contrib/etc/*.)

If you do not yet have HP-UX 10.0, or 9.10, you can download the latest *xntpd* release via anonymous ftp to *louis.udel.edu*. The University of Delaware Web site <http://www.eecis.udel.edu/~ntp/> archives NTP release information. The unbundled NTP release compiles easily on HP-UX 9.X systems. Because HP-UX did not have a kernel *adjtime* before HP-UX 9.10, you must compile and use the included *adjtimed* daemon written by Tai Jin of Hewlett-Packard.

### Finding an Outside Source of Time

Unless you have one of the few hardware clocks supported in the HP-UX release of NTP, you will probably look to the Internet for high-stratum time servers. See <http://www.eecis.udel.edu/~mills/ntp/clock1.html> for a list of stratum 1 and 2 servers. The list will grow in 1996 as the Naval Observatory installs new stratum 1 servers across the country. As they come



online they will be announced in the newsgroup *comp.protocols.time.ntp*.

It is considered bad form to access stratum 1 servers except from stratum 2 servers that will redistribute time to clients below them. And no more than two machines from each net should connect to the stratum 1 servers. Note that NTP messages need to pass 123/UDP packets through any company firewalls you might be behind.

You can use the *ntpdate* utility in debug mode to check access to an NTP server.

```
ntpdate -d tick.usno.navy.mil
```

requests four time packets from server tick and filters them to estimate network delay and clock offset. If you get the message

```
ntpdate: no server suitable for synchronization found
```

it means either that the server is down, or that you can't connect to it. The *ntpdate* program can be used in a *cron* file to make daily time corrections rather than using the continuous synchronization of *xntpd*. *ntpdate* can be run before *xntpd* in your system startup scripts to minimize NTP startup.

### Simple Client-Server Configuration

Here is a minimal config file that specifies the IP addresses of two known time servers:

```
driftfile /etc/ntp.drift
server tock.falcon.navy.mil prefer # look first to this
server 192.5.41.40 # This is tick.usno.navy.mil
peer silly.usno.navy.mil # same stratum as me
```

The *driftfile* statement specifies a file that will store the current NTP clock frequency error, which is looked at when NTP is restarted at bootup. The server lines point to known timeservers on the Net (the server *tock.falcon.navy.mil* is nonexistent). Since these happen to be stratum 1 servers, my host will be assigned to stratum 2. *Silly* is a second stratum 2 machine, and I *peer* with it. This means the two stratum 2 machines can depend on each other if one should lose its connection to the stratum 1 servers.

On a closed subnet without access to Internet servers, or when you don't care if the time is accurate so long as all your machines agree on it, you can configure one of your local machines as a sole timeserver.

In the server's *ntp.conf* file enter

```
server 127.127.0.10
```

This tells NTP to use the local, uncorrected system clock as the only source of time.

On each of your clients use the statement

```
server xxx.xxx.xxx.xxx
```

filling in the actual IP address of the server above. As the server's clock drifts, the clients will follow it precisely.

If you are adding a local hardware clock device, its driver is identified here by a directive like: *server 127.127.xx.0* where 127.127 alerts NTP that this is a local clock rather than a remote network peer, and *xx* is a clocktype described in the *xntpd* man page. The 10.0 *sam* will configure only a Spectracom WWVB radio clock. For GPS and other clock drivers you will need to get the public NTP distribution and replace */usr/sbin/xntpd*.

### Firing Up NTP

If you are not using *sam*, you should create the (empty) file */etc/ntp.drift* so that NTP can keep a record of its clock frequency updates, and will restart more quickly after reboots. To start up the external *adjtimed* daemon (pre-10.0/9.10), and then the NTP daemon, these commands can be put in */etc/rc* in pre-10.0 releases:

```
/usr/local/bin/ntpdate server_ip
/usr/local/bin/adjtimed
/usr/local/bin/xntpd
```

At 10.0 NTP is started from */sbin/rc2.d/S660xntpd*.

You can verify NTP's operation by looking at the records in *syslog*:

*Continued on Page 26*





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```
xntpd version=3.4m (beta multicast);
xntpd[2184]: tickadj = 5, tick = 10000, tvu_maxslew = 495
xntpd[2184]: precision = 30 usec
xntpd[2184]: peer 192.5.41.42 event 84: Peer reachable.
xntpd[2184]: clock correction -370.338880 too large (ignored)
xntpd[2184]: clock correction -370.338805 too large (ignored)
.
.
.
xntpd[2184]: clock reset (step) -370.338270
xntpd[2184]: offset 0.000782 freq -50.09114 comp 2
xntpd[2184]: offset 0.000305 freq -49.27866 comp 2
```

### Broadcast NTP

If you have many machines to synchronize, you can cut NTP network traffic in half (with some loss in precision) by using broadcast NTP. In broadcast mode a server sends out periodic time packets. Clients will listen for NTP broadcasts on UDP port 123 and sync to them. Any host can become an NTP broadcast server by adding the */etc/ntp.conf* statement

```
broadcast xxx.xxx.xxx.255
```

replacing the *xxx*'s with your network domain. Each client needs the statement

```
broadcastclient yes
```

in place of any server or peer statements.

In broadcast NTP a fixed network delay of 0.008 seconds is assumed but can be overwritten with the statement

```
broadcastdelay 0.xxxx.
```

### Restricting NTP Access

The */etc/ntp.conf* *restrict* statement allows you to control access to your own NTP servers. The combination

```
restrict default notrust noserve
restrict server1_IP
restrict server2_IP
```

means that this host will not serve time to anyone, and will trust no one for time except the two hosts *server1\_IP* and *server2\_IP*.

### Authenticated NTP

When you need to guard against malicious interference or IP spoofing, the

authentication option of NTP can be helpful. In authentication mode NTP messages include an additional field of encrypted data, generated from keys using the Digital Encryption Standard (DES) or Message Digest 5 (MD5) algorithms. A client can be configured to accept time packets only if they include an encrypted copy of a key known to both client and server, rejecting other time packets.

A server and its clients share one or more unencrypted keys in the file */etc/ntp.keys*. Each key is like a cleartext password. It can be an ASCII string or a 64-bit hexadecimal value. Each key has an integer id used to reference it.

To set up authentication—for example, using key id 11—include these statements in both client and server */etc/ntp.conf* files:

```
authenticate yes
trustedkey 11
```

Then on the server and each client, create the file */etc/ntp.keys* with an entry

```
11 A my_passwd
```

Next, modify the client's server directive in */etc/ntp.conf* to request the key id:

```
server xxx.xxx.xxx.xxx key 11
```

### How Well Does NTP Work?

An instant report on how well you are synched to your peers of choice can be obtained with the *xntpd* utility included in the public distribution. The command *xntpd -p* returns network delays, clock offsets (in seconds), and network dispersions for each peer or server:



remote	local	st	poll	reach	delay	offset	disp
*tock.usno.navy.192.5.41.43	1	128	377	0.00250	-0.000003	0.00200	
=tick.usno.navy.192.5.41.43	1	128	377	0.00188	0.000153	0.00204	

The *ntpq* program provides the same information (in millisecond units). The NTP *filegen* facility, described in the *xntpd(1M)* man page, will log time performance at regular intervals.

Using a local hardware clock, we are able to keep a time server synchronized to within 90 microseconds of true time 95 percent of the time, and to within 30 microseconds 70 percent of the time.

On our local LAN, HP 9000 Series 715 workstations keep in sync to better than four milliseconds 95 percent of the time, and to better than one half millisecond 75 percent of the time. Over wide area networks, as from Washington, D.C. to Miami, Florida, the clocks agree to .012 second 95 percent of the time, and to .001 second 70 percent of the time. ■

*Richard E. Schmidt manages UNIX systems in the Time Service Department, Directorate of Time, U.S. Naval Observatory, Washington, D.C. (He is an astronomer and computer specialist who has worked there for 20 years and still enjoys it.) Schmidt is in the process of installing GPS network time servers at strategic points across the Internet in a program designed to provide reliable and accurate Naval Observatory time to the World Wide Web.*

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Glance is a powerful tool for system performance diagnosis. Although it is very popular, many users do not take full advantage of the capabilities of the product, or do not understand how its many metrics can be used to optimize their systems' performance. In this article, I will present some background information on general system performance principles, cover some tips and techniques for getting the most from Glance, and list some common performance problems and how Glance can be used to characterize them. I'll also discuss how to customize your use of Glance to best suit your environment. This article is intended primarily for those who have a basic knowledge of the product; it is not a tutorial for new users.

### Performance Analysis

Many articles have been written on the art of system performance analysis. In an ideal situation, performance tools

would not be necessary at all. Your computer system would optimize its resources automatically and continually adjust its behavior based on the workload. In reality, it is up to system administrators to optimize system performance manually. I believe that tuning performance will always remain somewhat of an art. There are too many variables and dependencies in constant flux for a self-diagnostic to handle. For example, even the engineers who write the HP-UX operating system cannot always determine the performance impact of every change and feature they code into the kernel. This is one reason why we have

user-configurable kernel parameters and options such as disk mirroring, the logical volume manager, and commands to adjust process scheduling priorities. These facilities allow you to manage your configuration to best optimize the performance of your particular system. Different features affect performance in different ways. To

optimize performance in your environment, you need to understand your workload and the major resources of the system that may be under stress.

Let's briefly review some of the guiding principles of performance analysis:

**Know your system.** Your task of solving a performance problem will be much harder if you don't know what the system looks like when it is performing well. If you're lucky and proactive, you can get an understanding of the normal everyday workloads, throughput, and response times of the systems you manage before a performance crisis occurs. Then when you later take steps

## Using Glance Effectively



by Doug Grumann

to tune a system, you'll have baseline knowledge to compare against.

**Define the symptom.** Users like to say things like "The system's too slow," but subjective complaints are hard to address. Before you start changing things, define exactly what's wrong and try to set goals so that you'll know if you were successful. Many administrators use response time or throughput metrics to define their goals. Try to find something quantifiable, and write the goals down along with your measurements.

**Characterize the bottleneck.** People who do performance analysis consulting use the term *bottleneck* a lot. A bottleneck is a resource that is at maximum capacity and cannot keep up with the demands being placed on it. In other words, the bottlenecked resource is the part of the computer responsible for the system's not running faster. A more powerful CPU will do you no good if your performance bottleneck is in the disk I/O subsystem. Measuring performance with a tool like Glance allows you to characterize which resources are constrained so you can determine how to alleviate the bottleneck.

**Change one thing at a time.** Once you've isolated a performance problem and you decide how to address it, change only one thing at a time. If you change more than one thing at once, you will not know which change helped performance. It's also possible that one change will improve performance while another makes it worse, but you won't know that unless you implement them separately and measure performance in between.

A complete discussion of performance analysis might include information on topics such as benchmarking, system sizing, workgroup computing, and capacity planning. Other HP products such as MeasureWare and PerfView

address more long-term performance data collection and analysis needs. These topics are beyond the scope of this article. I will concentrate on the area of performance analysis that Glance is made to address: single-system online performance diagnosis.

### Glance Overview

The Glance product is available on several platforms including HP-UX, Solaris, and AIX. I will focus this material for HP-UX Glance. Note that the implementations of Glance differ in minor ways on the different platforms. In all cases, the purpose of the product is to address the "What's going on right now?" type of question for system administrators.

There are two user interfaces for Glance. The original interface is a *curses*-based character mode interface named simply *glance*. Two years ago, a second user interface was added to the product. This Motif-based interface is named *gpm*. You may use either or both programs to display performance data. The *gpm* interface imposes more memory and CPU overhead on your system; however, you may find it more intuitive, and some of its features go beyond what the character-mode interface provides. For the remainder of this article I will refer to *gpm* exclusively, but most of the examples apply equally well to either interface.

People often ask me why the data shown in Glance sometimes differs from the data shown by tools such as *sar*, *vmstat*, *iostat*, and *top*. Most often, the root cause of discrepancies is the underlying collection methodology. Glance uses special tracing features in the HP-UX kernel which are translated into performance metrics via the *midaemon* process. The "kmem" tools like *top* get their data from counters in the kernel

that are maintained by sampling instrumentation. Because a tracing methodology can capture all system state information, it is more accurate than data obtained via periodic sampling.

I strongly encourage new Glance users to get into *gpm*'s award-winning online help subsystem, and view its Guided Tour topics. The Guided Tour introduces you to the product and its concepts. Experienced Glance users (like myself!) also find the online help invaluable, with its topics such as Adviser Syntax Reference and Performance Metric Definitions.

### Top-Down Approach

There are over 1,000 performance metrics accessible from Glance. You do not need to understand even a small percentage of them in order to get your work done. The tool organizes its data in two different ways so that you need to look only at the metrics important to your situation. First of all, metrics are organized according to resource: there is a group of reports and graphs oriented around CPU, Memory, I/O, Networking, Swap, and System Tables. If your system is having no problems with I/O, then you need never investigate the reports in that area. Secondly, metrics are organized from a Global level down to an Application level and finally down to a Process level. As a whole, global metrics show you an overall summary of what is going on with the entire system. Application metrics allow you to group your system's workload into sets of processes representing different tasks. Then you can compare the relative impact of different applications on overall performance. Process metrics let you zoom in on specific processes and their individual attributes.

*Continued on Page 30*



Use Glance in a top-down manner to be most effective. When you first start *gpm*, the main graphical display will show you four potential bottleneck areas of performance: CPU, Memory, Disk, and Network. Each of these areas is represented by a graph and a button. The graphs show metrics for these resources over time, while the buttons give you status on adviser symptoms. The *gpm* adviser is a complex but powerful feature of Glance that I will discuss in more detail later. For now, just note that the color of the buttons can be your first clue to a performance bottleneck. If the CPU button turns yellow or red, you should investigate the utilization of the CPU resource. Use the main window to determine which area might be affecting performance. Drill down into report screens for that resource to characterize the problem further. Then use the Application or Process list reports to pinpoint the cause of the problem. Once you are down to the process level, you can determine which actions to take to correct the situation. It sounds easy, huh? Before we go into some examples, let's discuss a few important techniques.

## Applications

It's useful to view application data in Glance as an intermediate step between Global and Process data. If you manage hundreds of diverse systems, you may not have the time to group processes into applications on each system. Likewise, if you are managing systems that have basically only one application on them, then tuning your *parm* file application groupings may not be a good use of your time. On the other hand, if you are doing frequent performance analysis on multiuser systems, application groupings can be very useful.

Frequently, on my systems I'll have separate applications defined for backups and builds. Without looking at individual processes, I can quickly tell if my backups have been running too long or if a software build is interfering with my NFS server's other activities. Just keep in mind that if you don't want to use application groupings, you don't have to. Neither global nor process data is affected by your application *parm* file definitions.

## Sorting, Arranging, and Filtering

Too often I see *gpm* users scrolling through hundreds of lines of Process List detail, looking for an item of interest. It would save them time to just set up some filtering or sorting for the Process List report to bring the data they want into one window. For example, I usually set up a sort by Current CPU so that the processes that are most active will be at the top of the list. The default column arrangement can also be changed. For example, you can bring the memory fields RSS and VSS into view and sort by those fields if you are looking for memory hogs. Filtering allows you to set up intricate thresholds based on the type of data you'd like to view or highlight. For example, you can filter on the Physical I/O field so the Process List will report only processes doing I/O, and you can highlight processes that exceed a threshold you define.

Remember that your customizations of *gpm*, such as report field column arrangements, sort fields, and filter values (as well as colors, fonts, and measurement intervals), are saved in a *.gpmhp* file in your home directory. This file saves your customizations so that they stay in effect between invocations of *gpm*. Normally, I like to run *gpm* under my own nonroot user login so that other

people who share the root login with me won't change my *.gpm* settings. If you have several users who share root access on a system, you can also create separate *su* accounts for them with different home directories so they keep separate *gpm* configurations.

## Overhead

Any performance tool will impose a certain amount of additional overhead on the system. In the case of Glance, this overhead is significant only for CPU and memory. There is a tradeoff here: the more data you want to gather, the more overhead required to get the data. If you're concerned about CPU overhead, you can reduce the impact by running Glance with longer update intervals. One trick I've used in the past is to set the update interval way up to, say, 5 minutes, and then use the Update Now menu selection (just a carriage return in character-mode glance) to update intermittently when I want to see fresh data. You'll notice that *gpm*'s memory usage is higher than character-mode *glance*'s because it loads the Motif libraries. With systems getting faster and bigger all the time, you rarely need to be concerned about Glance overhead.

## New in Glance

New features are always being added to Glance. The *gpm* interface now has a continuous on-item help feature that lets you get instant information about any metric. The "choose metric" functionality of *gpm* allows you to select exactly which metrics go into the report windows. The *glance* character-mode interface now uses the Advisef technology (you'll also find the adviser alarm syntax used in HP MeasureWare). Reports have been added for Distributed Computing



Environment (DCE) support and Transaction Tracker metrics. Transaction Tracker is a user-defined transaction library bundled with HP MeasureWare. Glance for HP-UX 10.0 has several features including new Disk I/O detail information, Global and Process-level System Calls reports, and reporting and manipulation of Process Resource Manager variables. Details about these new features are found in the product release notes and online help.

### Examples

We'll now go through a few examples of using Glance to address specific performance problems. These should provide insight in to how to drill down into the data to characterize problems, but remember that every system is different—it's impossible to cover even a small percentage of all possible performance problem scenarios. Note that *gpm's* online help contains a few short case studies under its Performance Sleuthing topic that might also be useful to you.

### CPU Bottlenecks

Let's say the main window shows the CPU to be 100 percent utilized. This may mean that the CPU is bottlenecked, but then again it may not. Realize that it is *good* to have a resource fully utilized; it means that your system is fully taking advantage of its capabilities. On a single user workstation, the CPU might always be 100 percent busy because the user has the x11fish backdrop program running to entertain and distract visitors. If overall performance is fine, there is no problem. On another system, however, the CPU might be 100 percent busy and users might be complaining because their response time has fallen off dramatically. Then it's time to delve deeper into Glance.



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The CPU graph and report will tell you whether there is contention for the CPU. If so, then you may want to go straight to the Process List and sort on the top CPU consumers. The simplest common source of CPU contention is a runaway process. Often shell programmers will get scripts stuck in a loop, and sometimes they'll leave the loops active. When you see a process using as much of the CPU as it can get, spending all its time in User mode, and doing no I/O, then it might be looping. Check with the owner of the process. Compiles are also a major culprit in CPU bottlenecks. In software development environments, I've seen cases where a whole project team was slowed down because they all were doing their build on the same system. By mounting the source on an NFS server, we separated the compiles onto different systems and alleviated the bottleneck.

On a multiprocessor system, CPU bottlenecks can be very interesting to diagnose. For example, on a two-way MP system, a looping process can consume 100 percent of one processor while leaving the other processor idle. Also, it might "bounce" between processors, keeping each about 50 percent busy. Note that Glance normalizes CPU at the global level, so 100 percent busy in the main window means that *all* processors are 100 percent busy. The CPU By Processor report will show you how this breaks down into individual processor loads. The Process List report, since it is oriented on a process level, does not normalize CPU utilization. In our example of a looping process on a two-way MP system, the global CPU utilization might show 50 percent but the looping pid will show 100 percent utilization in the Process List. This makes

sense because if you had an eight-way MP system, you would want to see that process stand out: a single process in that environment could use only 12.5 percent of the overall system CPU resource because it could be active on only one processor at any one time.

In *gpm*, double-clicking on a process in the Process List gets you into the Process Resource report. This report is very useful because it shows you a lot of detail about what the process is doing. For example, some processes that use timers often have a very high proportion of System CPU, and you'll see a lot of context switching and perhaps Signals Received. I've sometimes surprised developers by showing them *gpm* screens of their programs in action, doing outrageous things like opening and closing 50 files a second.

### Memory Bottlenecks

Often in today's UNIX environments, it is normal to see physical memory fully utilized. This is a sign of a well-tuned system, because access to memory is so much faster than access to disk. Keeping text and data pages in memory speeds up subsequent references, and becomes a problem only when processes try to allocate more memory and the system is forced to flush buffers, page out data, or (worst case) start swapping. Sometimes, a memory bottleneck will disguise itself as a disk bottleneck, because memory management activities cause disk I/O. Normally, a good rule of thumb is to avoid swapping at all costs. A certain amount of paging is very normal (especially page-ins), but swapping occurs only when there are excessive demands for physical memory. *Note:* In HP-UX 10.0, swapping is called deactivation, but the basic concept remains the same.

Too often, I've seen the attitude that the simplest way to solve any performance problem is to buy more memory. Although this solution frequently works because memory bottlenecks are common, many times a cheaper alternative exists. In HP-UX 9.0, some systems experienced memory bottlenecks caused by the dynamic buffer cache growing too large. The buffer cache speeds up file system I/O, but on some systems it can grow too large and start causing excessive paging. Many administrators are familiar with the dynamic buffer cache patch to HP-UX that puts a limit on the size the cache can grow. In 10.0, there are *dbc\_min* and *dbc\_max* kernel parameters that allow you to fine-tune the cache to meet your needs. In most instances, I've found the 10.0 default values for these variables to be appropriate.

Glance's Memory report shows you the relative amount of physical memory allocated to the system, user pages, and the buffer cache. The System Tables report will help you decide if you should reconfigure the kernel with larger or smaller table sizes. Normally, you want to allocate enough space in tables so that you never have to worry about running out (the same goes for swap areas). If your system is tight on memory, you may consider reducing the size of some tables in order to make the kernel smaller, leaving more room for user data. I've seen systems running with unnecessarily huge values for *maxusers* or *nproc*, which increases the size of the kernel and can impact performance. A single user workstation does not normally need *nproc* values over 1000!

Isolating memory hogs in *gpm*'s process list is easy: sort or filter the report on the Resident Memory Set Size or Virtual Memory Set Size. Processes that allocate a lot of memory may have huge VSS values, most of which is usually paged



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or swapped out. I've often spotted programs with memory leaks by just watching their VSS size grow over time. Sometimes a developer will not find a memory leak during testing because a program is never executed for very long periods, but then when the program moves into production, the process will slowly consume memory over a matter of days until it aborts. The Process Memory Regions report available for individual processes in Glance is extremely useful for debugging memory problems.

### Disk Bottlenecks

Disk bottlenecks are very common on multiuser systems and servers. Glance's I/O By File system and I/O By Disk reports are extremely useful in isolating these problems. Look for file systems and disks with consistently high activity. Look at the Disk Queues to see if there are a lot of I/Os waiting for service. I've often seen cases where all the most frequently used files are on the root file system, which gets bottlenecked while other disks sit idle. Load balancing across disks can be an easy way to improve performance. Common techniques include moving swap areas and heavily accessed file systems off the root disk, or using disk striping, LVM, and/or mirroring to spread I/Os out across multiple disks. You can use Glance to verify the effectiveness of these methods. For example, LVM mirroring can improve read performance but degrade write performance. Using Glance, you can look at a volume that you're considering mirroring in order to verify that many more read than write I/Os are occurring.

The file system buffer cache, mentioned above, is very important in understanding disk bottlenecks. If your workload is file system disk I/O intensive, a large buffer cache can be useful

in reducing the number of disk I/Os. However, certain environments such as database servers using raw disk partitions don't make use of the buffer cache, and so a large buffer cache could hurt performance by wasting memory.

Ideally, what you'd like to see on your system are processes doing lots of logical I/Os and very few physical I/Os. Because of the effects of read-ahead and buffering, it isn't always easy to determine why an application is doing more or fewer physical I/Os, but Glance's Process Resource report and Process Open File report can be useful.

### Network Bottlenecks

As systems rely more and more on the network, we've begun to see more instances of bottlenecks relating to network activity. Unfortunately, at a system level, there are not as many good metrics for isolating network performance problems as there are for other bottleneck areas. For network servers such as NFS servers, you can sometimes use the process of elimination to isolate a network bottleneck: if your server has ample CPU, memory, and disk resources but is still slow, it may be due to LAN bandwidth limitations. You can use Glance to look at the client side and server side simultaneously. Several of Glance's NFS reports can be useful, especially NFS By System, which will tell you which clients are pounding your server the hardest. One example I've seen involved a user repeatedly executing the *find* command on NFS clients looking for old core files, but each *find* hit the same NFS-mounted disk over and over, causing needless overhead on the server.

In large environments, tools such as OpenView and PerfView are useful for monitoring the overall network and then they can turn to Glance to zoom in on spe-

cific systems with the greatest activity.

### The Adviser

Although you can use *gpm* effectively without ever even knowing about its Adviser feature, taking the time to understand it can be very profitable. I don't have space to cover this topic thoroughly, but it is covered extensively in *gpm*'s online help.

Basically, think of the Adviser as a set of rules based on performance metrics which can be used to take different actions. If you look at the default Adviser syntax, you'll see some rules that control the colors of the four primary bottleneck indicators, and some supplementary rules that generate alarms for things like high system table utilization. These default rules control the color of the buttons on *gpm*'s main window, and they are also visible in the Adviser Status and History reports. You should feel free to edit the rules to have more meaning for your own environment, because every system is different. You can always return to the default rules. Your customized rules are another aspect of the configuration of *gpm* that's stored in the *.gpm* file.

As an example of when you might want to change the default Adviser symptoms, let's say you have a large server system that's always fully CPU utilized, and frequently also has a high run queue. Although on many systems a large run queue is a CPU bottleneck indicator, this isn't always the case, especially on large servers. In our example, the high CPU util and the high run queue always make the CPU bottleneck symptom in the default Adviser syntax go red. It isn't helpful if a button is always red. You would want to edit the Adviser syntax to bump up the criteria so that a CPU red alert goes off only when the run queue exceeds, say, 10 instead of 3.



The full potential value of the Adviser is in adding syntax for your own particular environment. For example, let's say that you know from past experience that when the physical disk I/O rate exceeds a certain value, user response time degrades. If you are willing to let *gpm* stay running for longer periods, you can put in some adviser syntax that will alert you via e-mail of the problem:

```
if gbl_disk_phys_io_rate > 2000 then
  exec "echo 'disk i/o rate is high' | mail root"
```

You can get really fancy with these rules. You can combine metrics, define variables, and use looping constructs. You can generate Alerts, execute UNIX commands, and print information to *gpm's stdout*. What follows is a more complex example to illustrate Adviser "programming." More examples are in *gpm's* online help.

```
# check for high system-mode cpu utilization, and when it is high print the
# highest sys cpu consuming process.
if gbl_cpu_sys_mode_util > 50 then {
  highestsys = 0
  process loop
    if proc_cpu_sys_mode_util > highestsys then {
      highestpid = proc_proc_id
      highestname = proc_proc_name
      highestsys = proc_cpu_sys_mode_util
    }
  print "--- High system mode cpu rate = ", gbl_cpu_sys_mode_util, " at ",
    gbl_stattime, " --- "
  print " Process with highest system cpu was pid ", highestpid|5|0,
    ", name: ", highestname
  print " which had", highestsys, " percent system mode cpu utilization"
}
```

## Summary

In order to manage the performance of your systems effectively, you need to understand a little about the art of performance analysis, and you need a good tool like Glance. I encourage you to spend some time getting to know your system's performance characteristics before a problem occurs. When you are involved in a performance crisis, objectively define the symptoms of the problem, and then use them to guide you through analysis. Use Glance to characterize the bottlenecked resource. Follow the tool's top-down methodology to go from a high-level bottleneck down to the process responsible, if possible. When you know what's wrong, make a change but change only one variable in the environment at a time so you can gauge its success.

As you become more familiar with Glance, I hope you'll have some fun exploring the different capabilities of the tool. Happy Glancing! ■

*Doug Grumann is a software engineer who has been at the HP Performance Technology Center in Roseville, California for five years.*

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# Developing Client-Server Applications with HP Distributed Smalltalk

**Frederick F. Chew**



# Part 1

The proliferation of client-server and object-oriented technologies has prompted the customer community to demand standards for interoperability. In 1989, an international standards consortium called the Object Management Group (OMG) was formed by a group of software vendors to address such issues. This standards body has grown to over 530 information vendors and interested parties. OMG includes companies such as Hewlett-Packard, SunSoft, Digital Equipment Corporation, Novell, Oracle, and Versant Object Technology, to name a few. The continuing goal of this body is to define and agree on a set of specifications and services regarding how information is to be passed from one entity to another in a networked, heterogeneous computing environment. Specifically, the specifications focus on what it means to have entities called objects distributed over such an environment. The efforts of the OMG have resulted in a set of specifications called the Common Object Request Broker Architecture (CORBA) Version 1.2. At the time of this writing, the OMG is working to enhance and expand the specifications for Version 2.0.

An object is simply an encapsulated entity of attributes (data) and behaviors (code). In languages like Smalltalk and C++, a developer writes classes to describe various objects. A class is a blueprint necessary for object creation. The class embodies built-in or user-defined types as well as a set of operations that it is capable of performing. The interfaces to such operations are visible to the environment outside the object, and external software entities called clients communicate with the objects by sending messages to their public interfaces.

Hewlett-Packard's contributions to the CORBA specifications have resulted in a software development product called HP Distributed Smalltalk (HPDST). HPDST is a full implementation of the CORBA specifications plus a number of important extensions. This object-oriented, client-server development tool permits an experienced Smalltalk developer to quickly develop and deploy peer-to-peer applications on two or more computer systems that support the CORBA specifications.



HP Distributed Smalltalk consists of a set of classes that are used to enhance a Smalltalk dialect called VisualWorks from ParcPlace Systems, Inc. Together, HPDST and VisualWorks constitute a powerful CORBA-compliant, development environment equipped with browsers, debuggers, inspectors, and workspaces. VisualWorks Smalltalk is a superset of *Smalltalk-80*, the original research language invented at XEROX Palo Alto Research Center in the 1970s.

In the first section of this article, I will give the reader an overview of the CORBA concepts as implemented by HPDST. I will illustrate and explain key CORBA modules, such as the *Object Request Broker (ORB)* and the *Interface Repository (IR)*. Second, I will provide a quick overview of the HPDST features and some of the tools that the developer can expect to use. Third and finally, I will share with the reader a sample HPDST application and explain its distributed architecture. The application is based on HPDST 4.0 with VisualWorks 2.0 and is implemented on HP 9000 Series 700 or Series 800 machines. To avoid boring the reader by trying to explain every line of every method, I will concentrate on HPDST fundamentals that a developer must understand in order to be successful in this environment.

## The Common Object Request Broker Architecture

### The Object Request Broker

The heart of the Common Object Request Broker Architecture is an entity called the *Object Request Broker (ORB)*. The ORB is like a postal system and is basically responsible for routing client requests to objects, whether the objects reside on a

local computer system or a remote one. The client is unaware of the location of the recipient object and the recipient object does not know the location of the client. All of the communication between client and object is performed by the ORB and such activity happens transparently as if all the participants were on a single computer system.

The ORB runs within an HP Distributed Smalltalk image. When a client requests a service from the ORB, the ORB sends the request either directly to the recipient object if it is local or to a *surrogate* if the recipient object is remote. The surrogate is an object reference, which forwards a service request to the ORB for resolution.

The client request specifies not only the object that will perform the operation but also the operation itself and any required parameters. Objects that can respond to service requests from external clients are called *CORBA* objects. Non-CORBA objects are typical Smalltalk objects that can only respond to requests within the image in which they reside.

### The Interface Repository

The key to making interprocess communication between objects appear transparent is a layer within the CORBA called the *Interface Repository*. The Interface Repository shields the application programmer from the need to understand the details of the network protocol. The repository houses the interfaces of the public methods or operations that are callable by any external CORBA-compliant client.

The Interface Repository provides a way to separate a method's interface from its implementation, an essential aspect of flexible, modular design. The interface

of a method can reside within a client image while its implementation can reside on a server image. This arrangement allows greater freedom to enhance a method's implementation without the need to upgrade client images wherever they have been deployed.

The method interfaces for the Interface Repository are written in a language called the *Interface Definition Language (IDL)*. The IDL is a declarative language and borrows some lexical rules and grammar from ANSI C++. HP Distributed Smalltalk provides a transparent mapping from Smalltalk to IDL and vice versa.

The Interface Repository is built on top of the *Network Computing System (NCS) Remote Procedure Call (RPC)* specification. HP Distributed Smalltalk uses RPC, which is part of the *Open Systems Foundation (OSF) Distributed Computing Environment (DCE)* standard. Through the NCS DCE specification, the Object Request Broker handles the job of *marshaling* and *unmarshaling* data onto the network. Marshaling is the process of converting a Smalltalk object into a byte stream and unmarshaling is the reverse process. The overall result is that client service requests appear to be local regardless of where the requests originate from the network.

### Standard and Extended Services

The CORBA specifications define a set of standard core services for object systems to interoperate. The standard core services include support for the Interface Definition Language, the Interface Repository, a static invocation interface, and a dynamic invocation interface. Static invocation means that the type of the object and the method to be called are known at compile time,



whereas dynamic invocation requires determination of such information at runtime. In the latter case, it is the responsibility of the client to specify the object, the method, and the necessary parameters. Since Smalltalk has its own ability to perform dynamic binding, HPDST applications use static invocation for efficiency.

The CORBA specifications also include a set of standard object services. Here are some of them:

*Naming Service:* a policy to define how object names are assigned and organized so that objects can be located in any CORBA-compliant system.

*Event Notification Service:* a protocol that allows objects to inform each other of interesting occurrences, even when recipient objects are temporarily unavailable.

*Basic Lifecycle Service:* a set of policies for creating, copying, moving, externalizing, internalizing, and destroying objects. Externalizing means to convert a Smalltalk object into a byte stream for transmission to a remote server. Internalizing is the process of converting a byte stream back to a Smalltalk object.

In addition to standard CORBA services, HP Distributed Smalltalk offers an extended set of services to support Hewlett-Packard's *Distributed Application Architecture (DAA)*, a set of policies to support cooperative, distributed, object-based systems. Included in these policies are:

*Properties:* a standard means to describe and distinguish objects. They are part of an object's external interface (its owner, creation date, version, etc.). Properties allow users to associate information with objects.

*Links:* a set of policies to support networked relationships among objects. With links, object clusters appear as single objects to clients and end users. Link

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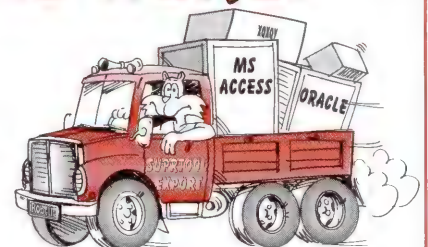
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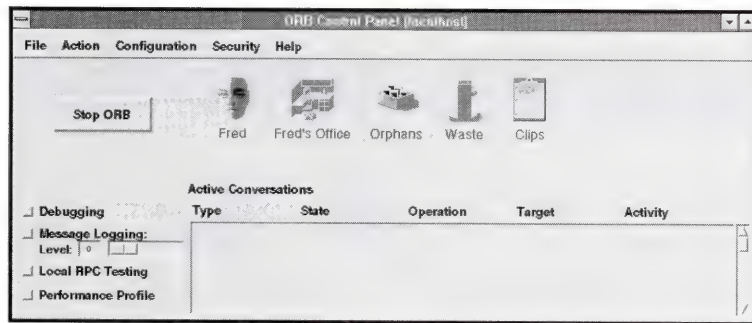
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FIGURE 1



policies help regulate the various levels of referential integrity for objects.

**Application Objects:** These are large-grain objects that consist of smaller objects and links. An interface called *application assistants* is responsible for managing the links within the application objects.

**Presentation-Semantic Split:** a scheme to subdivide an object into two logical portions (presentation and semantic) so as to make the best use of the network. As will be explained later, the sample application is constructed on top of this important mechanism.

Detailed information on the services provided by CORBA and HPDST can be found in the list of references at the end of this article.

## HP Distributed Smalltalk

### The User Interface

When a developer installs the HPDST classes onto VisualWorks, he will obtain an environment that is ready for enhancement and customization. After the installation, the developer will see an *ORB Control Panel* (see Figure 1), the main vehicle used to activate and monitor the *Object Request Broker* of the computer in which it resides.

The user interfaces that come with HPDST are menu-driven and icon-based. When the user clicks on the Office icon of the ORB Control Panel,

he will see a number of ready-made objects in his office.

The environment comes equipped with a Clipboard and a Wastebasket for cut, copy, paste, and delete operations. Furthermore, a number of container objects, such as the File Cabinet, Bookcase, and Folder are available to help the user organize his objects. A demo folder contains a number of sample application objects such as Forum, Chart, and Order Entry objects.

The Object Request Broker of the local computer can also connect and communicate with the ORB of a remote machine. If the connection is successful, a building icon representing the remote machine appears to the user. When the user double clicks on the remote building icon, he can then enter the remote user's office and access the remote user's objects as if they were local.

### The Development Tools

The underlying VisualWorks-HPDST environment is composed of an extensive collection of class hierarchies. Like traditional high-level languages, Smalltalk comes with primitive objects such as numbers, integers, floats, characters, and booleans. In addition, there are traditional data structures such as collections, lists, arrays, strings, ordered collections, bags, sets, and dictionaries. Many of these classes are subclasses of other classes. By conservative estimates, this environment

offers over 850 classes from which the developer can build his solution.

To help the developer find what he needs, VisualWorks comes equipped with browser tools. The browser is a work area where the developer can define new classes or modify existing ones. In addition, he can add, change, or delete the methods of a class. The *System Full Browser*, in particular, is very useful for viewing the methods inherited from one or more superclasses.

VisualWorks 2.0 provides a comprehensive set of graphical user interface tools so that the developer can construct windows and dialog boxes quickly. The tools consist of elements such as a canvas builder, color palette, components palette, menu editor, image editor, and properties controller.

These graphical tools help the developer build *application models*, classes that handle user interface actions and the display of data. For sophisticated situations, developers can separate the internal logic and persistent objects of the application models into *domain models*. This modular approach enables the developer to construct different application models that share the same domain models.

Finally, when the developer has designed, constructed, and tested his classes, he is ready to prepare his Smalltalk image for production. This preparation is called *stripping*, which removes unnecessary classes from the production image. This action removes functionality that the end user should not have and provides better usage of memory and storage resources. To help the developer take some of the guesswork out of stripping, HPDST provides a stripping tool where he can choose what to remove.



## A Sample Application: the Bulletinboard Retrieval Service

### The Business Needs

Many companies these days purchase site-licensed software in order to legally equip all of their employees with a common set of desktop tools and utilities. Such volume purchases are cost effective and help reduce the proliferation of physical media as software distribution can be done through a network. The HPDST application I am about to describe is a bulletinboard for retrieval of such licensed software.

The bulletinboard is within a folder of other informational objects residing within a server image of a remote HP 9000 Series 800 computer. Users run a client image from an HP 9000 Series 700 workstation in order to make a connection to the remote image. After they navigate to the *Information Site Services* window, they can open the bulletinboard tool called the *Bulletinboard Retrieval Service* (see Figure 2), select the item desired, and retrieve it. Each product is bundled as a single, compressed archived file. Installation instructions for each product are furnished within text objects of the *Setup Instructions* folder.

Vendors tend to release new software regularly and frequently. That being the case, it is important that users have access to the latest versions in a timely fashion. At the same time, it is important that the overall client-server architecture is easy to support from the point of view of the applications administrator. Finally, the architecture should make the best possible use of the capabilities of the network.

### The Architecture of the Bulletinboard

The diagram in Figure 3 provides an

overview of the client-server architecture of the bulletinboard application. As I had mentioned earlier, HP Distributed Smalltalk provides a mechanism called the *presentation-semantic split*. This means that a distributed object can be separated into two logical objects, where the presentation portion handles user-specific interactions and the semantic portion handles information that is shared. As in the bulletinboard application, the presentation and semantic run from different images at different locations. The presentation-semantic split is a many-to-one relationship. The mechanism provides ways for presentation objects to be aware of semantic changes. Conversely, there are ways for semantic objects to be informed of semantic changes initiated from a presentation object.

Let us take a closer look at the various components of the bulletinboard architecture. *BulletinboardPO* is the class rep-

resenting the presentation portion of the bulletinboard object. The architecture actually has two different presentation objects, each one representing the needs of a particular user community: (1) the end user who simply wants to retrieve the software he desires and (2) the applications administrator, who needs the retrieval function as well as some functions to add, change, and delete selections. The presentation portion for the end user would look like Figure 2 (corresponding to *BulletinboardPO* of the client image), whereas the one for the administrator might look like Figure 4 (corresponding to *BulletinboardPO* of the server image). The PO object for the administrator provides a *Manage Selections* button that provides the capability to add, update, and delete product selections.

*BulletinboardSO* is the class representing the semantic portion of the bulletinboard object. The semantic portion

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FIGURE 2

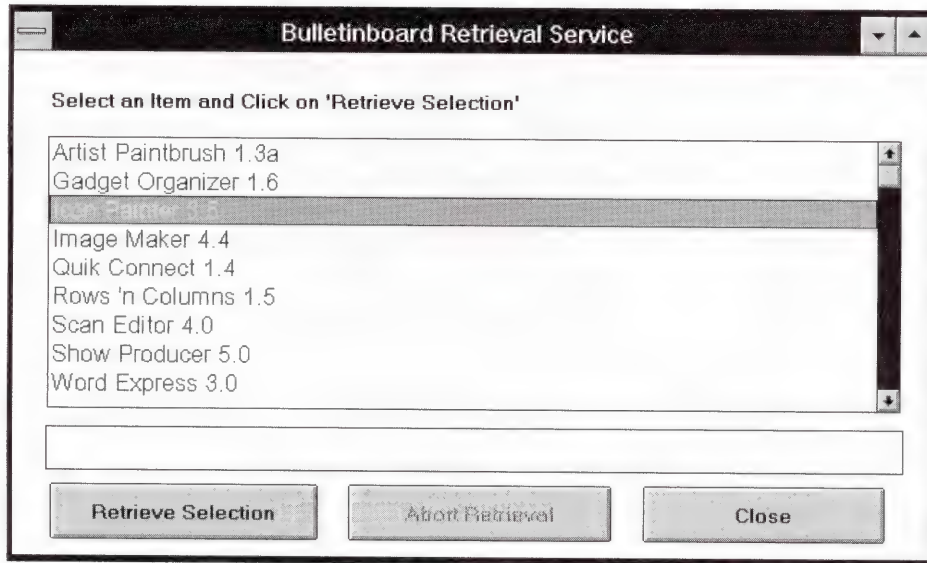
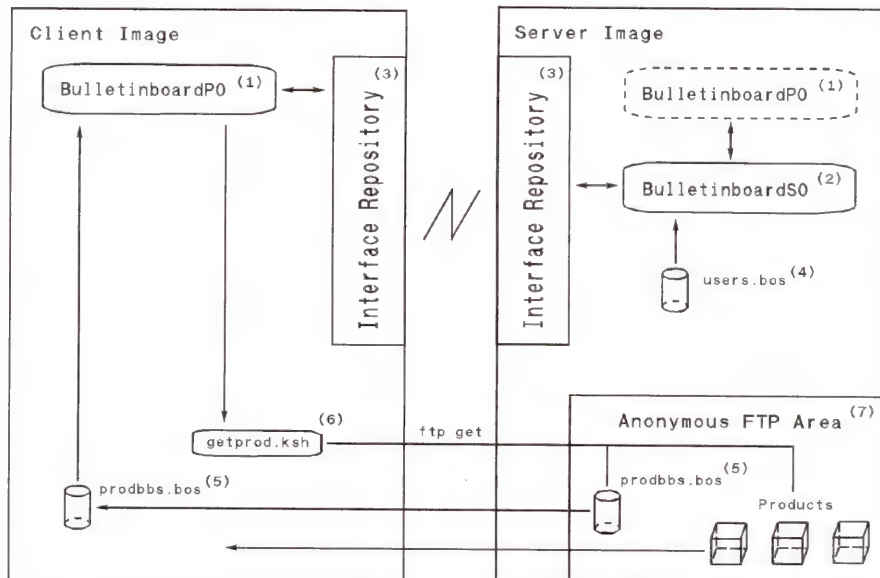


FIGURE 3

### Architecture of the Bulletinboard Retrieval Service



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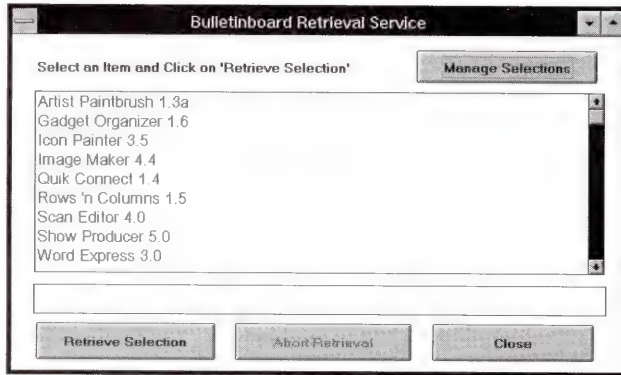
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FIGURE 4



was designed to deal with the administrative functions for each user. One such function regulates the number of times a user can open a bulletinboard (the *updatePresenter*: instance method, which informs the presentation counterpart that an instance may already be active). Another function determines whether the user will be entitled to automatically receive an updated product listing (the *checkUserUpdate*: instance method, which may trigger the transfer of file *prodbbs.bos* from the server to the client). In addition, if a new product listing is transferred to the user, the semantic portion resets the particular user's update indicator in the user's registration file (*users.bos*) so that this action will not be repeated.

The *Interface Repository* is a registry for *BulletinboardPO* methods that are remotely callable by the semantic counterpart. Similarly, *BulletinboardSO* methods listed in the *Interface Repository* are remotely callable by the presentation counterpart. The *oneInstance*: method inherited by *BulletinboardPO* and the *checkUserUpdate*: method of *BulletinboardSO* are examples of repository methods. Methods not registered with the *Interface Repository* are not remotely callable by the opposite counterpart.

The *users.bos* file is an all users registration file in *Binary Object Streaming Service (BOSS)* format. The *BOSS* format allows Smalltalk objects to be saved as records and retrieved as the original objects. For this sample application, each record is an Association object (key-value pair) with another Association object as the key and an update indicator as the value. The inner Association object has a user id as the key and the user's password as the value. The administrator would be responsible for adding, changing, and deleting such records into the *users.bos* file and he would use a different application for this purpose. The *users.bos* file tracks who is entitled to use the site's information services, which include the bulletinboard service.

The *prodbbs.bos* file is the product selection file. Each record of this file is an Association object that has a product description as key and an archived, compressed HP-UX file name as the value. This file is positioned on the side of the user's client image so that it can be quickly read by *BulletinboardPO*. If the administrator had set up a new *prodbbs.bos* file on the server side and had set the update indicator for the user, the user would automatically initiate a transfer of the new *prodbbs.bos* file when he opened the

bulletinboard the next time. After the new *prodbbs.bos* file has been transferred, his bulletinboard dialog box will present the list of new selections. The advantages of this design are twofold: (1) the user is automatically synchronized to the latest listing of products he is entitled to retrieve and (2) while the applications administrator prepares the new *prodbbs.bos* file and adds, updates, or removes the actual product files, he is free to determine when some or all of the users are notified of the new selections.

The *getprod.ksh* file is a Korn shell script that runs the *ftp* utility to get user-selected products or a new *prodbbs.bos* file. The shell script is called as a separate HP-UX process by *BulletinboardPO* so that the user is free to execute other applications. There is another Korn shell script called *abort.ksh* that can be called by *BulletinboardPO* to cancel the current retrieval process and remove any incompletely transferred files.

For this application, a read-only anonymous ftp directory structure was set up on the machine of the server to house all of the archived, compressed product files. New *prodbbs.bos* files are also placed into this public staging area.

To be continued in the next issue of *hp-ux/usr*. ■

*Frederick F. Chew is a software design engineer in HP's Professional Services Organization. He is currently composing an HP Press book entitled Building CORBA Applications with HP Distributed Smalltalk, which is expected to be published early next year.*

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### Firewalls and Internet Security: Repelling the Wily Hacker

ONE OF THE FIRST BOOKS TO ADDRESS FIREWALLS from a conceptual and implementation-specific level, *Firewalls* is written by two experts in the field: the guys who developed and maintain AT&T's firewalls.

Using a very easy-to-understand, almost conversational style, Cheswick and Bellovin describe the system they developed for AT&T and its pros and cons. Surprisingly at first, they describe their system in fairly detailed terms. I say at first because they explain why "security through obscurity" (i.e., hiding what you are doing) is not the way to design a security system.

The book is divided into four major sections: Getting Started, Building Your Own Firewall, A Look Back, and Odds and Ends. I recommend reading the book in the following order: Chapter 1 (Introduction), Chapter 10 (An Evening with Berferd), then the rest of the book.

Chapter 1 describes what the book is about and Chapter 10 describes how the authors monitored and documented a Dutch cracker who thought he had compromised their system. It turns out that Berferd was one of several Dutch kids who were trying to crack computers all over the world.

Section II, Building Your Own Firewall, is a step-by-step recipe for creating a firewall using public domain and custom programs. The authors describe each action, why they chose the approach being described, and what issues to be aware of and watch out for. They leave very little out of the discussion of their implementation.

Besides the specifics of creating the firewall, the authors describe how to set up a monitoring and logging system to help determine who is cracking your system and what damage the cracker has done. In Chapter 12 (Legal Considerations) they discuss the legal aspects of monitoring and

whether the log files from a firewall can be used as evidence in a court of law. There are a lot of restrictions on their use and the chapter provides a clear description of what a System Administrator must do to keep them admissible.

In a controversial chapter, Chapter 8 (The Hacker's Workbench), the authors describe the tools a cracker has available to compromise a system. (In case you haven't caught on, I disagree with calling these criminals "hackers." Hackers are people who know about and enjoy computer programming and solving problems. Crackers do what they do out of greed or malicious intent.) After reading the chapter, I agree with the authors: A firewall maintainer must know what is being used against him or her to recognize an attack and defend against it.

One nice paragraph style the authors use is a "bomb" symbol to indicate "particularly serious risks" to the security of a system. They describe them clearly in the text and have a one- or two-line summary of all "bombs" in one of the Appendices.

The authors end the book by taking hardware and software vendors to task about the security (or lack thereof) in their products.

Though the book was written in 1994, much of what they describe is still applicable today. (Isn't it odd thinking of 1994 as out of date?) There are some new public domain toolkits and the ones described in the book have been enhanced, but it is still an excellent starting point for designing and implementing a firewall or just learning more about them. ■

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**Title** *Firewalls and Internet Security: Repelling the Wily Hacker*

**Authors** William R. Cheswick and Steven M. Bellovin

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by Larry Headlund

## More Shell Games

WE ARE WORKING ON MAKING A Motif front end to a shell script. In my last column I defined a bit of the problem and said why I would be using the Korn shell. Incidentally, the approach I developed would work equally well as a front end to any interpreted language, Perl, Scheme, Lisp, Tcl, SQL, or whatever. The simple idea is making the GUI program write to standard out. The execution line will look like:

```
guiprogram -name myname |ksh &
```

What *guiprogram* writes is a series of commands to *ksh*. The commands are interpreted by *ksh* and can do anything *ksh* can, including famously sending e-mail to Afghanistan. The argument *myname* allows you to have one program with many different behaviors. This is possible because the content of the commands is defined in the app-defaults file, *Myname*. Of course, you could pipe to a script rather than directly to *ksh* and have the script define additional behavior. I will refer to the receiving program, in the example *ksh*, as the shell the rest of this column.

### If You Don't Use Wcl

This style of programming comes naturally to me since I use Wcl (Widget Control Language; see <ftp.x.org/contrib> for a copy) by choice as my X programming tool. Wcl allows you to specify callbacks and callback arguments through the X resources. For example, a line such as

```
*thiswidget.activateCallback: myfunc("hello world")
```

would make *myfunc* the activate callback for the widget named *thiswidget*. Since the definition of *myfunc* would look like

```
void myfunc(  
Widget widget,  
char* strArgument,  
caddr_t unused)
```

the value of *strArgument* for *mywidget* would be "hello world." I use this property of Wcl extensively in what follows. What do you do if you don't use Wcl? You use the resources for the argument only. Suppose you have already specified the callback through your usual means. In your resource file add a line such as

```
*thiswidget.argument: hello world
```

Then your function definition for *myfunc* will look like

```
void myfunc(  
Widget widget,  
caddr_t ignored,  
caddr_t unused)
```



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```

{
    char    strArgument[MAX_SIZE];
    ...
    XtGetValue(widget,
               "argument", strArgument);
    ...

```

The variable *strArgument* will now contain “hello world” as before. So, in the code that follows, just insert similar code to mimic the argument passing of Wcl when you are using other tools.

### First Things First: General Functions

The simplest thing to do is to path a literal string out to the shell. I need two options here, one to pass the string without adding a carriage return at the end and one with. I would not want a carriage return on a line like

```
variable_name=
```

with the value to be output later by another function. The code for the two functions, *printCommand* and *printCommandReturn*, are in *Listing 1*. Note that these two functions act the same regardless of the type of the calling widget. This is how I use a button press, for example, to set a variable *value*.

### XmText Functions

The most interesting thing about an *XmText* widget is the value of its text string. You would want to pass this along to the shell. The function *printText* (*Listing 2*) does exactly this. Note that it uses its argument as a formatting string. Since there are lots of formatting tools in UNIX, and hence available to the shell, the formatting is tied with the other property of this function—that it outputs only if the string value has a positive length. This allows you to have something like

```
*myfunction.activateCallback: printText("copies=%s")
```

which will set the variable *copies* only if there is something to set it to. Also, the notion of not saying anything unless and until you have something to say is a basic UNIX principle.

The second function, *printTextTarget()*, in *Listing 2* prints the value of a named *XmText* widget. This uses the function *WcFullNameToWidget()*, which is part of Wcl. This function takes a specification, say “\*thiswidget” or “\*foo\*fubar,” and returns that widget. Why bother with this? There are two reasons. Number one, it may seem inelegant to have a widget constantly announcing its value to a shell when you need to use that value only at the end. More important, how do you communicate the value of a widget to the shell if its value is never changed? The *printTextTarget()* function allows an *XmPushButton* activate callback, for example, to query a widget for its value.

### LISTING 1 General Functions

```

void printCommand(
Widget    w,
char*     strCommand,
caddr_t   unused)
{
    (void)fwrite(strCommand,
                 sizeof (char),
                 strlen(strCommand),
                 stdout);
    (void)fflush(stdout);
}

void printCommandReturn(
Widget w,
char*   strCommand,
caddr_t unused)
{
    (void)fwrite(strCommand,
                 sizeof (char),
                 strlen(strCommand),
                 stdout);
    (void)fprintf(stdout, "");
    (void)fflush(stdout);
}

```

### XmList Functions

You want to be able to use list functions. It would seem lame not to allow a user to select items from a list. This is one of the functions that use Korn-shell-specific syntax. I envisioned this function putting the values from the *XmList* widget into an array. Hence I built the syntax of the output to use a variable name as an argument and to fill a Korn shell array of character strings. The function *printSelectedList()* in *Listing 3* does just this.

The second function, *printSelectedListTarget()*, is there for the same reasons as *printTextTarget()*. We have some other functionality, beyond getting the value, the selected items, for *XmList* functions. We may need to get the entire list, not just the selected items. That is what *printItems()* is for.

**LISTING 2** *XmText Functions*

```
void printText(
Widget widgetText,
char* strFormat,
caddr_t unused)
{
    char* strValue = XmTextGetString(widgetText);
    if (strlen(strValue)) {
        if (strlen(strFormat) > 0) {
            char strNew[512];
            (void)sprintf(strNew,
                          strFormat,
                          strValue);
            (void)fprintf(stdout, strNew);
        }
        else {
            (void)fprintf(stdout, strValue);
        }
    }
    (void)fflush(stdout);
    XtFree(strValue);
}

void printTextTarget(
Widget widget,
char* strWidgetName,
caddr_t unused)
{
    Widget w = WcFullNameToWidget(widget,
                                    strWidgetName);
    if (w) {
        printText(w, (char*)0, unused);
    }
}
```

**LISTING 3** *XmList Functions*

```
void printSelectedList(
Widget widgetList,
char* strVariableName,
caddr_t unused)
#endif
/* output list as list of strings set to variable name */
if (widgetList) {
    XmStringTable selectedItems;
    int selectedItemCount;
    int i;
    XtVaGetValues(widgetList,
                  XmNselectedItems,
                  &selectedItems,
                  XmNselectedItemCount,
                  &selectedItemCount,
                  NULL);

    if (selectedItemCount > 0 &&
        strlen(strVariableName)>0){
        (void)fprintf(stdout,
                      "set -A %s ",
                      strVariableName);
    }
}
```



**LISTING 3** *XmList Functions, continued*

```

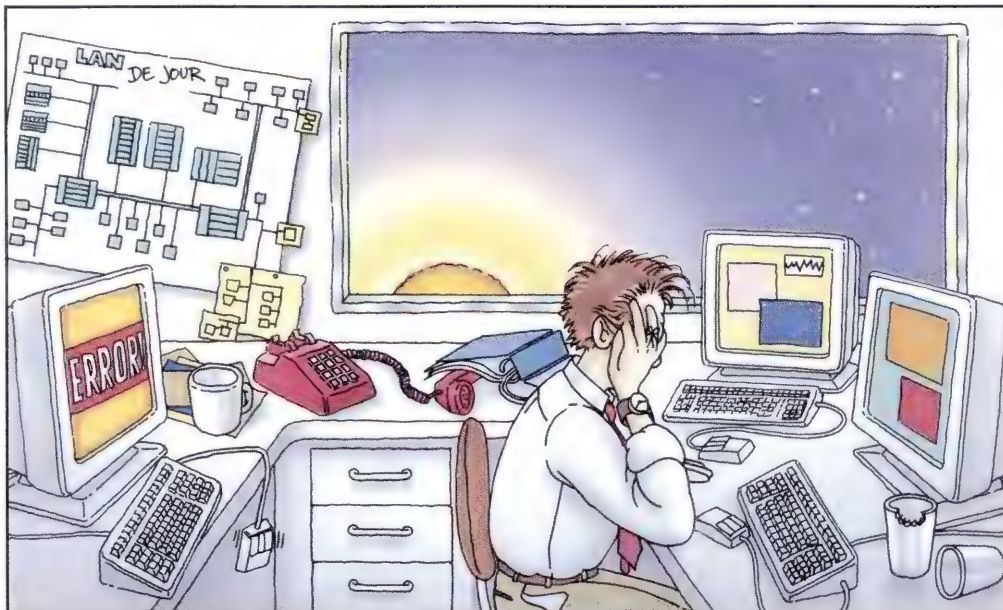
        for(i = 0; i < selectedItemCount; ++i) {
            char* strValue;
            if (XmStringGetLtoR(
                *selectedItems,
                XmFONTLIST_DEFAULT_TAG,
                &strValue)) {
                (void)fprintf(stdout,
                    "%c%s%c ",
                    '\\',
                    strValue,
                    '\\');
                XtFree(strValue);
                ++selectedItems;
            }
            (void)fprintf(stdout, "\\n");
        }
    }

    static void printSelectedListTarget(
        Widget widget,
        char* strWidgetName,
        caddr_t unused)
    #endif
    {
        Widget w = WcFullNameToWidget(widget, strWidgetName);
        if (w) {
            printSelectedList(w, (char*)0, unused);
        }
    }

    void printItems(
        Widget w,
        char* strList,
        caddr_t unused)
    #endif
    { /* output list as list of strings */
        Widget widgetList = WcFullNameToWidget(w, strList);
        if (widgetList) {
            XmStringTable items;
            int itemCount;
            int i;
            XtVaGetValues(widgetList,
                XmNitems, &items,
                XmNitemCount, &itemCount,
                NULL);
            for(i = 0; i < itemCount; ++i) {
                char* strValue;
                if (XmStringGetLtoR(*items,
                    XmFONTLIST_DEFAULT_TAG,
                    &strValue)) {
                    (void)fprintf(stdout,
                        "%c%s%c ",
                        '\\',
                        strValue,
                        '\\');
                    XtFree(strValue);
                    ++items;
                }
            }
            (void)fprintf(stdout, "\\n");
        }
    }
}

```

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**LISTING 4** *XmSelectionBox Functions*

```

void printSelectedItems(
Widget widgetSelection,
char* strVariableName,
caddr_t unused)
/* output list as list of strings set to variable name */
Widget widgetList = XmSelectionBoxGetChild(
    widgetSelection,
    XmDIALOG_LIST);

if (widgetList) {
    printSelectedList(widgetList,
        strVariableName,
        unused);
}

void printSelectedItemsTarget(
Widget widget,
char* strWidgetName,
caddr_t unused)
{
    Widget w = WcFullNameToWidget(widget, strWidgetName);
    if (w) {
        printSelectedItems(w, (char*)0, unused); }
}

void printSelectionBoxItems(
Widget widgetSelection,
char* strVariableName,
caddr_t unused)
#ifdef
/* output list as list of strings set to variable name */
Widget widgetList = XmSelectionBoxGetChild(
    widgetSelection,
    XmDIALOG_LIST);

if (widgetList) {
    if (strlen(strVariableName)) {
        (void)fprintf(stdout,
            "set -A %s ",
            strVariableName);
    }
    printItems(widgetList, "this", unused);
}
#endif

printSelectionBoxItemsTarget(
Widget widget,
char* strWidgetName,
caddr_t unused)
#ifdef
{
    Widget w = WcFullNameToWidget( widget, strWidgetName);
    if (w) {
        printSelectionBoxItems(w, (char*)0, unused); }
}
#endif

void printSelection(
Widget widgetSelection,
char* strFormat,
XmSelectionBoxCallbackStruct* cbs)
#ifdef
{
    char* strValue;
    XmStringGetLtoR(cbs->value,
        XmSTRING_DEFAULT_CHARSET,
        &strValue);
    (void)fprintf(stdout, strFormat, strValue);
    XtFree(strValue);
}
#endif

```

**XmSelectionBox Functions**

Anything we wanted to do directly to an *XmList* widget we would want to be able to do to the *XmSelectionBox* compound widget, or at least its child *XmList* widget. The functions in *Listing 3* take care of this magic.

There is one other thing you would want an *XmSelectionBox* to do that an *XmList* couldn't do: print its selection value. The last function in *Listing 4*, *printSelection()*, does just that.

**Conclusion**

These functions won't supply all your needs for every shell front end you might want to create, but I have found them to be enough for that 10 percent functionality that solves 90 per cent of the problem. ■

---

Larry Headlund is the president of Eikonai Systems, a UNIX and Motif development commune, and has been working with commercial UNIX since 1983 and with X since 1987. He can be reached at [lmh@world.std.com](mailto:lmh@world.std.com) or at 617.482.3345.

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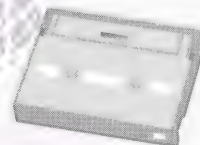
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by Geff Blaha

**Q:** How does a 743rt processor know it is the slot 1 controller, when installed within a VME crate?

**A:** The 743rt and 743i processors monitor a VME backplane signal called *BG3IN\**. For the specific slot in which the 743 processor is installed, if the *BG3IN\** signal is found to be LOW (asserted), the 743 processor knows it is the slot 1 controller. It then drives *BG3OUT\** HIGH (deasserted), which is propagated to the next card's *BG3IN\**. If a 743 processor's *BG3IN\** signal is HIGH, it knows it is not the slot 1 controller. Thus, for slot 1, *BG3IN\** will be LOW, and for all other slots, *BG3IN\** will be driven HIGH by the slot one controller.

**Q:** I have noted that the 742rt and 743rt have different utilities available in the LIF volumes for HP-RT Revision A.02.03. What is the purpose of these utilities, and why are they different between the LIF volumes?

**A:** The utilities listed in the two LIF volumes are different because of unique hardware differences between the 742 and 743 processors. For example, the 743 has the capability of graphics support, so there is a graphics diagnostic (CRAYON) for the 743 only.

Files in *\$HPRTroot/usr/lib/rtbootlf.740* are:

ISL:	Initial System Loader
AUTO:	AUTO file used in autobooting a system from ISL
RTBOOT:	HP-RT boot utility (used within ISL)
VMEDIAG:	VME Stand Alone ISL Diagnostic
TDIAG:	PCX-T Processor, memory and IO diagnostics
IOMAP:	Offline IO map utility—identifies connected interfaces and devices

Files in *\$HPRTroot/usr/lib/rtbootlf.743* are:

ISL:	Initial System Loader
AUTO:	AUTO file used in autobooting a system from ISL
RTBOOT:	HP-RT boot utility (used within ISL)
ODE:	Offline Diagnostic Environment (used within ISL)
SYSLIB:	Used by ODE
MAPFILE:	Used by ODE
IOTEST:	Runs ROM-based selftests on I/O modules (Run from ODE)
TIMIDIAG:	VME Controller Chip Test for Anole (Run from ODE; replaces VMEDIAG as found on rtbootlf for 742rt processors)
MEMTEST:	Memory diagnostic (Run from ODE)
LASIDIAG:	Core I/O diagnostic (Run from ODE)
LDIAG:	CPU diagnostic for PCX-L processors (Run from ODE)
PERFVER:	Runs ROM-based selftests on peripherals (Run from ODE)
CRAYON:	Crayon graphics diagnostic (Run from ODE)

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CIRCLE 111 ON READER SERVICE CARD



**Q:** I am attempting to boot HP-RT on my 743rt over the VME backplane, using VME Backplane Networking Revision A.02.01. I have noticed it takes minutes to boot to ISL, and an hour or more to boot an HP-RT kernel. What could be causing the slowdown in the boot process?

**A:** During configuration of HP-UX VME Backplane Networking, there is a utility to configure the network for VME Backplane Networking. This utility is *bp\_config*. One of the parameters selects the interrupt type to be used:

```
# bp_config [-bus|-poll] [-f cfgfile]
```

where *-bus* selects vme bus interrupts, and *-poll* selects polling. At Revision A.02.01 of VME Backplane networking, *-poll* is the default interrupt type, if no interrupt type is chosen:

```
# bp_config -f /etc/vme/vme.CFG
```

By either using the default or choosing *-poll* interrupt type, performance for booting HP-RT over the VME Backplane will suffer. It is recommended to use *-bus* interrupts:

```
# bp_config -bus -f /etc/vme/vme.CFG
```

This will ensure vme bus interrupts are used, which will speed the boot process considerably.

**Q:** I have the following SWSM configuration entry in my *\$HPRTrout/etc/conf/cfg/bp0.cfg* file:

```
0:bp0:A24+SUP_DATA_ACCESS:0x200000:0x50000:0:\
SYSTEM_ONLY+TRUE_RMW+ACCEPT_BLT
```

When I use this SWSM entry, I find HP-RT on my 743rt will boot over the VME backplane, but eventually an HPMC will occur, usually during the configuration of the bp0 driver. What could be causing this crash? Is there something wrong with my configuration above? I am using VME Backplane Networking Revision A.02.01.

**A:** The SWSM entry you are using, as documented in the *VME Backplane Networking Manual*, part number B3803-90001, is incorrect. The file *\$HPRTrout/etc/conf/cfg/bp0.cfg* is correct as shipped. The manual error is being addressed with

Service Request 4701295543. Entries in the hints section of the SWSM entry above are exclusive or'd together. Each hint is defined as:

```
SYSTEM_ONLY = 0x01
TRUE_RMW    = 0x01
ACCEPT_BLT  = 0x40
```

Since *SYSTEM\_ONLY* and *TRUE\_RMW* are both defined as "1," the result from an exclusive or would be "0," which means we will not be using both *SYSTEM\_ONLY* and *TRUE\_RMW*. *SYSTEM\_ONLY* is required for VME Backplane Networking; the lack of this hint is the reason for the HPMC crash. By using *ACCEPT\_RMW* instead of *TRUE\_RMW*, we have:

```
SYSTEM_ONLY = 0x01
ACCEPT_RMW  = 0x10
ACCEPT_BLT  = 0x40
```

Because each hint is defined with a different bit, there are no conflicts which, after an exclusive or, would negate one or more of the hints. Ensure your *bp0.cfg* file has the entry:

```
0:bp0:A24+SUP_DATA_ACCESS:0x200000:0x50000:0:\
SYSTEM_ONLY+ACCEPT_RMW+ACCEPT_BLT
```

as documented in the *\$HPRTrout/etc/conf/cfg/bp0.cfg* file.

**Q:** When I boot my 743rt system, I see the following message right after HP-RT loads into memory and the launch address is displayed:

```
PDC returned -13 on system time request
```

What does this message mean? How can I fix it?

**A:** The message displayed is referring to a hardware status return from a system time request by HP-RT to the hardware—in this instance, your 743rt processor. Since the time was not successfully retrieved, a PDC status message was returned. This *-13* status is:

```
Time of day invalid
```

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**CIRCLE 122 ON READER SERVICE CARD**



This is usually a hardware problem. Possible causes are:

1. On-board Lithium battery is dead
2. On-board Lithium battery does not have the paper insert removed prior to installation
3. HP-RT processor is faulty
4. VME slot is faulty
5. VME crate is faulty

**Q:** Is the HP-RT Developer's Kit supported on 10.XX HP-UX hosts?

**A:** The HP-RT Developer's Kit is supported only on HP-UX hosts systems Revisions 9.0X, for HP-RT revisions up through A.02.1X. Support on 10.XX HP-UX hosts is planned for the near future.

**Q:** I am executing a user-written application on my HP-RT system, and occasionally I see an HPMC occur, and my system panics. The trap is a "High-priority machine check," and the check type is *bus*. I am executing HP-RT Revision A.02.03. What does this mean, and how can I fix this problem?

**A:** The above error means your system has experienced an SGC bus timeout. This could be due to the configuration of the SGC\_BUS\_TIME\_OUT parameter. In the file `$HPRoot/usr/include/machine/sysdev.h`, you will find this value set to a default of:

```
#define SGC_BUS_TIME_OUT      250
```

To increase this parameter, ensure you are a superuser on your HP-UX host system, and change this parameter to be:

```
#define SGC_BUS_TIME_OUT      1000
```

Save these changes and then create a new HP-RT kernel. Boot this new kernel to take advantage of the parameter change. Using this new kernel, you should not see further SGC bus timeouts due to SGC\_BUS\_TIME\_OUT being set too low for your VME access needs.

**Q:** After configuring and enabling the crashdump device for a 743rt processor, during the boot phase, I see the message:

```
sim0_install: no memory for statics pointer
```

After this message is displayed, HP-RT ceases to boot and appears "frozen," or hung. I am running HP-RT Revision A.02.03. What could be causing this message?

**A:** This error is occurring because of a change in PDC for the 743rt, and HP-RT is not expecting the results it receives. The above error suggests a lack of memory on your 743rt. If you have Revision 303.0 PDC or later, this error can occur.

A patch has been created for HP-RT revisions A.02.00 through A.02.03 to correct this problem. Contact your local Response Center to obtain the patch for Service Request 4701305383. HP-RT Revision A.02.11 has corrected this problem for Revision A.02.10.

Once you have successfully installed the patch, it will be necessary to make a new HP-RT kernel for your 743rt. If you attempt to boot an HP-RT kernel without this patch, and you have the crashdump device defined and enabled, you will probably see the above error. Once a new patched kernel is booted, the error should not occur. The crashdump facility can be disabled *only* by booting this new, patched kernel. This problem does not occur on 742rt processors. ■

---

*HP-RT Operating System questions are answered by Geff Blaha, a support engineer in the HP-RT Expert Center. He has worked with and supported Real-Time systems for over 17 years as a Customer Engineer, Real-Time Response Center Engineer, and HP-RT Expert Center Engineer. He can be reached at [geff@hprurch.mayfield.hp.com](mailto:geff@hprurch.mayfield.hp.com).*

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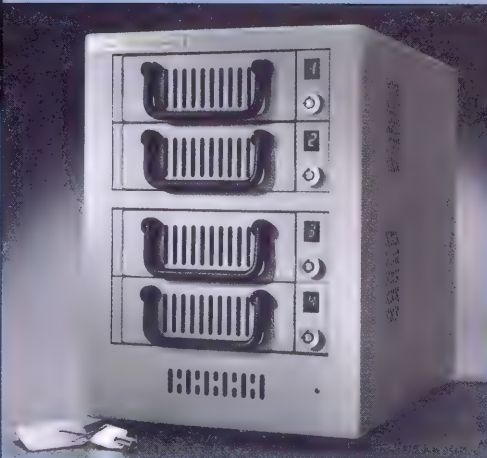
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I'M FINDING MORE AND MORE ftp sites that are encouraging their users to access their files via Web browsers such as Netscape and Mosaic. This can be a plus. A number of popular ftp sites have restrictions on the number of clients that can log in to download files. By using a Web browser, your chances of getting into the system are increased (even though the response may be poor).

## COMP.SYS.HP

### *XForms Version 0.75*

T.C. Zhao announced the availability of XForms V0.75 on the HP 9000 Series 300 (m68k). His package now runs on the HP 9000/7xx and 9000/3xx series of HP machines.

According to Zhao, "XForms is a graphical user interface toolkit and builder based on Xlib for X Window Systems. XForms is a portable and efficient C library that can be used in both C and C++ programs. The library works in all visuals and all depths (1-24) and comes with a rich set of objects such as buttons (of many flavors, including color XPMs as labels), browsers, sliders, and menus integrated into an elegant event/object callback execution model that allows fast and easy construction of X-applications. It also has OpenGL (on SGI) and Mesa support.

"The Forms Library is very intuitive and simple to use. It is by far the easiest-to-learn and easiest-to-use system for X GUI development. You can start writing XForms-based programs within an hour once you go through the first five pages of the documentation and have run and read a couple of the demos. Actually, you don't have to write any code; the bundled GUI builder will do it for you."

Unfortunately, there is one downside to this software package. It does not come with source code. XForms comes bundled with precompiled static and shared libraries and header files. Tons for source and documentation is also included as well as 200 pages of documentation.

The software is available from the following three sites:

*<http://bragg.phys.uwm.edu/xforms>*

*<ftp://bloch.phys.uwm.edu/pub/xforms>*

*<ftp://ftp.cs.ruu.nl/pub/XFORMS> (Europe mirror)*

If you want to get a quick feeling about this program, point your Web browser to *<http://bragg.phys.uwm.edu/xforms>*.

### **Teapot Version 0.6**

Do you remember the PC program Visicalc? If not, ask someone older than you. Visicalc was the first electronic spreadsheet program, the progenitor to Lotus 1-2-3 and Excel. If you have missed having a simple spreadsheet-like program, especially one that runs on a UNIX computer, then you should look at this program, the Table Editor and Planner (Teapot).

Note that the version number hasn't reached 1 yet, since some functionality is still missing and it requires public testing. Nevertheless, it is a program that's worth look-

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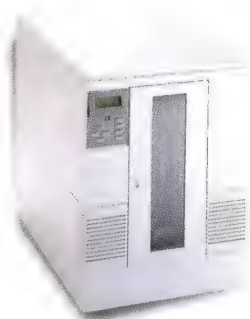
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CIRCLE 119 ON READER SERVICE CARD



ing at. There is extensive documentation: an ASCII doc file and man pages as well as an included PostScript user guide. This program is not graphics-oriented; it uses a curses interface. On HP-UX systems, you need to have a copy of the ncurses package (since HP's curses is a bit retarded). One possible site for ncurses is <ftp.cc.gatech.edu>. The ncurses package is found in `/ac88/linux/libs` as `ncurses-1.9.7a.tar.gz`. The Teapot docs say you should at least have Version 1.9.7 of ncurses (which is very new).

Teapot is available via anonymous ftp from <cantor.informatik.rwth-aachen.de> in directory `/pub/unix/`. Do a "dir teapot\*" to see if there's a later version than 0.6.

## ALT.SOURCES

### *strobe* Version 1.03

Strobe is yet one more network/security tool that locates and describes all listening tcp ports on remote and/or local hosts. The usefulness of the program is shown in the following example. By entering the command

```
strobe -a 80 -i /etc/hosts -s -f -V -S services -o outfile
```

program strobe will strobe all hosts in your `/etc/hosts` file. If we have probed up to port 80 on a host and have still not seen a connection, then that host is skipped. Speed and time statistics for each host and for the totality of hosts are sent to `stderr`. The regular output is placed in `outfile`.

This program is available from the author, Julian Assange ([proff@suburbia.net](mailto:proff@suburbia.net)), at [suburbia.net](http://suburbia.net) in `/pub/strobe.tgz`.

### *mh* 6.8.3

How do you read your e-mail? If your e-mail client runs on a PC or if you are using a commercial UNIX product and are satisfied with it, then stop reading about this program. However, many users are still using good old faithful mailx. If you're one of them, then you owe it to yourself to look at the mh package. Mh is a software mail product, developed in conjunction with the University of California at Irvine and the Rand Corporation.

Mh works on a different principle than mailx. Whereas mailx is a single program used for reading and writing mail, mh is a system that consists of a collection of fairly simple single-purpose programs for reading, sending, and saving e-mail messages. Furthermore, in the mh system, each piece of mail is saved as a separate file. Therefore you may freely intersperse mh commands with other shell commands during the processing of the e-mail. Folders can be easily created for maintaining e-mail.

Mh is, of course, fully integrated with emacs. I use the emacs environment for all my e-mail processing, including composing letters and maintaining my folders. O'Reilly and Associates has even published a book on mh.

The tar file of the mh system is available on [louie.udel.edu](http://louie.udel.edu) [128.175.1.3] in `portal/mh-6.8.tar.Z`. You may also find mh at <ftp.ics.uci.edu>. Building mh isn't complicated but the instructions in the READ ME file should be carefully read since there are

many configuration options you may want to set.

## COMP.EMACS

### *ema-font.gui*

### *ema-keys.gui*

Sometimes you don't need source code but just good documentation. Jari Aalto from Finland posted an announcement of a couple of interesting files available from his site, <ftp.uta.fi>. In the `/pub/incoming` directory are files *ema-font.gui* and *ema-keys.gui*.

*ema-font.gui* is an ASCII file that contains useful answers and solutions to questions regarding the use of fonts and fontifying in emacs. The file *ema-keys.gui* explains the basics of key bindings in emacs. It includes a brief tutorial on how to bind keys in emacs. Each file is about 1,600 lines long. If you use emacs a lot and haven't quite figured out all the ins and outs of fonts and key bindings, then these documents are worth reading.

## WEB PAGES

### <http://www.deter.com/unix/>

Matthew Deter maintains an interesting Web page. A large variety of UNIX security-related information can be acquired from here. Included are a number of papers related to UNIX and TCP/IP (some in ASCII, some in PostScript). All the major security-oriented software packages are here, too.

### <http://www.itw.com/~imagesys>

Image Systems Company has been kind enough to post a large amount of clip art for use (in noncommercial environments) with Web page development, or anything else for that matter. Currently

available are high-quality clip art and textures. Soon to follow are icons and images.

<http://www.perl.com/>

In the beginning of 1995, I described the interpretive language called Perl. Perl has been available for a number of years now and in fact O'Reilly and Associates has published two books on the subject. These books reflect Version 4 of the language. Version 5 has now been out for about a year. At this site, you are pointed to the Perl Version 5 Reference Guide. You can also find the list of all sites that make up the CPAN (Comprehensive Perl Archive Network).

<http://www.jumbo.com/>

This is a wonderful site for downloading shareware and freeware. The software is separated into the following categories: business, games, home and personal, programming, utilities, and words and graphics.

Under the games category, for example, you'll find action games, strategy games, classic games, arcade games, shoot-'em-up games, fantasy and adventure games, space games, puzzles, and card games. Operating systems and hardware supported, depending on the category chosen, include Windows, Windows 95, Windows/NT, DOS, Macintosh, OS/2, and UNIX. I have downloaded many shareware games that my children have checked out.

<http://hpux.cae.wisc.edu/>

Someone had originally posted a question on one of the HP-UX Usenet groups asking the following: "Does anyone have any games loaded on their HP? I have a G40 Business Server and

recently installed HP-UX 10.01. I would like to download some games but don't where to get them." Sebastian Voges ([voges@informatik.uni-muenchen.de](mailto:voges@informatik.uni-muenchen.de)) was kind enough to respond by noting that The Liverpool (UK) HP-UX Software Archive had some game packages. This was a new one on me. I hopped over to there (<http://hpux.csc.liv.ac.uk/>) and subsequently found that a mirror site existed a bit closer to home in Wisconsin.

This is a nice archive. In fact, it's packed with goodies. There are more than 30 categories of software available and anywhere from 10 to more than 50 packages within each category. With each package is a READ ME file that can be downloaded independently of

the source file. For many of the packages, screen images of the software are available to be viewed before downloading the sources. ■

*Joe Berry is a senior software developer at Landmark Systems Corporation in Vienna, Virginia. He is one of the authors of Landmark's performance monitor, TMON for UNIX. A former HP 3000 systems specialist for Hewlett-Packard, he has been in the computer industry for more 20 years. He can be reached at [joe@landmark.com](mailto:joe@landmark.com).*

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CIRCLE 130 ON READER SERVICE CARD



by Lisa Zahn

## Micro Switch IC Sensor Design Group

THE SUBJECT OF THIS ISSUE's site profile is the IC Sensor design engineering group in the Micro Switch Division of Honeywell, Inc. We spoke with Cary Trlica, IC Sensor Design CAD/CAE engineer.

### **SS: How is your support organization structured?**

We have two development organizations at our site: the IC Sensor Design group and the Product Development group. The IC Sensor Design group develops industrial and automotive controls, while the Product Development group develops LAN products for the telecom industry and laser, light, and infrared sensors for industrial applications.

I am part of the IC Sensor Design group engineering department. Although I am an engineer, I am also the primary support person for the group. I have one technician who works for me; together, we support about 20 users. There is also one primary support person for the Product Development group; he supports about 10 users. The Product Development support person and I serve as backup for each other. And, because we're closely linked to the Micro Switch location in Freeport, Illinois, the divisional resources at this site can also back us up.

### **SS: What administrative areas do you support?**

I provide general operating systems support for seven HP Series 700 workstations (load, patch and so on). The Product Development support person provides similar support for four HP systems.

I support the public domain utilities; set up the printer and plotter queues, and answer questions about them; maintain the logical network usage, balance, and configuration; and maintain user data security. My technician does the machine backups. I answer end user

questions and I provide training in UNIX and IC CAD tools. I also do EDA application installation; Freeport CAD/CAM provides this type of support for the MDA applications in Product Development.

My technician and I provide hardware support up until a service call is required. We also work together to maintain the physical network topology. Our group also has 25 486-based PCs; my technician does 90 to 95 percent of their maintenance. I serve as his backup.

### **SS: Does anyone carry a beeper or do second/third shift support?**

I carry a beeper—there is no onsite second/third shift support, but it is available on call.

### **SS: Do you do development in addition to your support responsibilities?**

I do development in support of the engineering activity—that is, productivity improvement scripts and programs.

### **SS: You mentioned your environment has HPs and PCs. What operating systems do they run?**

Our site has five 715/50s and two 735/100s. These systems have 64 MB to 128 MB of RAM, high-end color, and 3 to 8 GB of disk storage. All of the HPs run HP-UX; I'm upgrading them this week from HP-UX 9.01 to HP-UX 9.05. The PCs run DOS 6.0 plus Windows 3.1; however, we plan to move them to Windows NT this year. Ten of the PCs also run X Windows; we use Hummingbird's eXceed package. The IC design engineers do their design work on the PCs; the back-end IC layout design is done on the HP workstations.

We also have some Apollo machines, although we're phasing them out—our major applications package is from Mentor Graphics Corporation, and with their Version 8 release two years ago, we were required to migrate off the older

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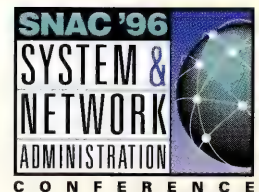
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**CIRCLE 125 ON READER SERVICE CARD**



Apollos. We have a couple of DN3500s, a couple of HP 425s, and one DN4500. They are all operational and see sporadic use, except for one of the 425s, which I use as an X terminal into the HP-UX systems.

**SS: What applications are run in your environment?**

Our group uses Mentor Graphics Corporation's IC Layout/Design software for full custom integrated circuit design, and we use PSpice from Microsim for large, compute-intensive IC simulations. We use Ansys from Swanson for mechanical analysis, TMA software for process simulation, and BBN/Cornerstone for statistical analysis. We also run software development applications and support some factory data collection databases. We run office automation applications on our PCs.

The Product Development group uses the Pro/Engineer mechanical design package from Parametric Technology. They also use Ansys (which I maintain).

**SS: Does your environment use central file servers and compute servers for shared resources or is your environment widely distributed?**

Because we are migrating from an Apollo environment, local data storage has been the precedent. The workstations are all standalone, and user data is stored locally on individual workstations. We don't currently use servers; our counterparts in Freeport are experimenting with the client-server approach, and we may go to it in the future.

**SS: Do you try to ensure software consistency on your workstations, or is that not an issue for your site?**

I try to keep all the machines the same as far as HP software is concerned.

**SS: What does your network look like?**

We use a combination of bridges and routers, all of which are 10 Mb. Our wiring consists of Thinnnet to the bridges and routers, then 10BaseT to the workstations. All the PCs are on 10BaseT as well. Internet access goes by leased line to Freeport, from there to Minneapolis, Minnesota, and from there to the outside world.

We also have one dialup port, which I have not been able to make work with SLIP/PPP.

**SS: What's your printer environment like?**

We have a large plotter directly connected to a print server; all plots from CAD applications are funneled through this print server. We also have monochrome and color PostScript printers that we connect to the network directly (we don't hook printers to desktop stations). We use the UNIX lp spooler to manage our printer queues.

**SS: What communications services do you support between your users and between your users and their associates?**

We support e-mail, file transfers, WWW/Mosaic, and dialup/modem access. Our internal mail protocols include sendmail/SMTP and x.400. We also support site aliases for users and groups.

**SS: Do you implement a firewall for Internet security?**

There are two firewalls in place, one at Honeywell corporate and one at the Micro Switch division level. The Micro Switch firewall is more restrictive, and eliminates all access from outside the division except for e-mail.

**SS: What's your backup strategy?**

We do daily incrementals, weekly fulls, and monthly fulls using HP Omniback with a tape autochanger. We do this for disaster recovery; each released design is backed up separately.

**SS: How do you authenticate your users on your networked computers?**

We use NIS to maintain a sitewide registry of users. NIS seems to work fine; the only troubles I have are when the master goes down or when the network has a problem and the NIS master is unreachable. The Domain/OS registry is also still operational, but the accounts are different from the ones on HP-UX, so we don't operate the two together. We don't run Kerberos or the DCE secid, and we have not implemented password checking, password aging, or minimum passwords.

**SS: What's your organization's rationale for the level of security implemented at your site?**

The Apollos I inherited were completely open! With the HP-UX environment, I have tightened things up a bit, but there is a lot of data sharing between the users. However, our machines are secure from people outside of Honeywell because of limited access to the building and the Internet firewall.

**SS: What kind of training do you support for your users and do you yourself participate in?**

We offer both one-on-one and organized user training. All of my HP-UX training has been "on the job" except for one training session on DNS from HP, which I found to be quite beneficial. My training for applications has been on an "as needed" basis. ■

---

*Lisa Zahn is vice president of Ibis Communications Inc., a technical documentation and training consulting firm. She was one of the first five technical writers at Apollo Computer, Inc. and was a Learning Products manager at HP's Chelmsford, Massachusetts facility for several years before forming Ibis.*



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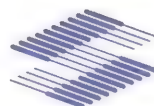
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CIRCLE 126 ON READER SERVICE CARD





# CSL Perspective

AS MANY OF YOU PROBABLY know by now, HP has shipped HP-UX Version 10.0 to its many customers. For most of us, it's been a long time in coming, something like four years, if I recall. There has been so much change over that time too. The Series 700 has had three or four hardware roll-overs, giving us 9.01, 9.03, 9.05, and now 9.07, as well as the two versions for the Series 800. We've been fortunate that, for the most part, the bulk of the application and utility software ran on all these versions without having to be recompiled. Although there have been many bug fixes and enhancements to the 9.X version of HP-UX, the core operating system code was fairly stable. There were a lot of patches to keep track of for sure, but we managed pretty well.

As I've been anticipating the 10.0 tapes showing up at my office door, I'm beginning to plan how this version should be rolled out into our environment. Here are some strategies I use when doing upgrades:

1. Become familiar with the changes and enhancements by thorough reviewing of the READ ME documents and Release Notes.
2. Ensure that the end user clearly understands the implications and risks associated with the upgrade. Get commitment to move forward.
3. Install the update on a nonessential system before attempting a migration on a user system.
4. Document each step of the migration. Take complete notes, paying particular attention to any unexpected results.
5. Always, always, always do a *full* backup of the system *before* making *any* changes.

6. Use network (i.e., "netdist") distribution whenever possible.
7. Take inventory of the system after the installation to determine which files were *not* modified or replaced.
8. Perform another full backup once the system is ready to turn over to the user.

In previous upgrade processes, I've made a conscious decision to spend a significant amount of upfront time in planning. My goal is to ensure that any changes made to a system are as risk-free and painless as possible. With individuals and business wholly dependent on their systems, any delay or disruption can significantly affect the organization. Trouble can also result if quality is overlooked. It's far cheaper to minimize or eliminate the causes of poor quality than to try to filter out problems later.

As I'm building my upgrade plan, I have to consider seriously the impact of this upgrade on the large collection of freeware that we are using. Although I've been using packages from various sources almost my entire career, the last several years I've seen a dramatic increase in both the amount of software and the pervasiveness of its use. In some cases, the package is essential for our users. It therefore is imperative that these packages are available in a 10.0 environment.

Unfortunately, many other users are faced with the same reality. There is no single source for up-to-date ports of all the software I need. The major sites I frequent, like Liverpool and Interex/InterWorks, have not started doing the testing since they rely on the authors to make changes. Since the developers of the packages may not have initially developed on HP-UX, they may not get

around to making the necessary changes for 10.0. It looks as though the solution is to dig into the software and do the porting on our own.

So, by the time you read this, I'll probably have ported a good deal of the software in the Interex CSL that we use. And you can bet those packages will in the spring CSL release. I also intend to share the experience in upcoming columns, discussing some of the implications and risks I spoke about. I would encourage any of you who are so inclined to submit the results of your porting activity, as well. It's a big task, to be sure. But who better to undertake it than us!

A final footnote: There have been some significant changes in the Interex staff in 1995. I would like to welcome two new staff members, in particular: Deloy Cole, the new Director of Technology Services, and Jim Keller, the MIS Director. Each of them brings to Interex many years of both technical and management experience. I hope you all will drop them a short note to welcome them to our association. ■

*Paul Gerwitz is Chairman of the CSL Committee and is a Senior Technology Specialist at Eastman Kodak Company in Rochester NY. He can be reached at 716-477-3067 or e-mail at [gerwitz@interex.org](mailto:gerwitz@interex.org) or [gerwitz@kodak.com](mailto:gerwitz@kodak.com).*

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# HP 1000 Guru

**Q:** I am trying to get a printer to work on my C MUX. I want to use XON-XOFF protocol, not ENQ-ACK. I have all the proper CN commands to disable ENQ-ACK and enable XON-XOFF. When I use a datascop to monitor the RS-232 line, I still see an ENQ coming from the MUX.

What is wrong?

**A:** This question brings up a curious fact about the 12040A/B/C MUXs. The MUX can perform what looks like a “double” ENQ-ACK. This is because both the driver *and* the firmware can be told to ENQ-ACK independently of each other. The standard `CN,lu,30B` command will enable ENQ-ACK in the firmware. The driver can also be made to ENQ-ACK handshake via bit 0 of driver parameter 1. This is documented in the *Driver Reference Manual*, Appendix J (part number 92077-90011) under driver parameters. The manual also states that you should *not* set bit 0 to enable ENQ-ACK but rather use bit 7 of the CN 30B.

The confusion arises because all the default gen record files for the C Mux set bit 0 of DP1. Thus, the MUX driver is always set to ENQ-ACK handshake regardless of the `CN,lu,30B` command. Thus if you use the default gen record, the driver will ENQ-ACK.

The following CN request will disable the driver ENQ-ACK by modifying DP1:

```
CN,lu,44b,param
```

where *param* is the desired value of DVP1. See *Table 1*.

The following are the recommended DVT entries for HP terminals and printers on the C MUX.

Terminal on a C MUX:

```
dvt,/rte_a/%dd*00,M26XX,LU:130,DP:1:20004B,TX:57,-  
DP:5:CI:20040B:20040B:0,DP:9:CM:20040B:20040B:CM
```

Printer on a C MUX:

```
dvt,/rte_a/%dd*00,M2631,LU:131,DP:1:2,TX:57
```

With these gen records, you will be able to set/change the handshake protocol with CN30B/34B requests as needed.

**Q:** I am trying to connect a modem to my 12040D MUX and am having problems getting it to work. I am trying to set the baud rate to 9600 with the modem bit set in my CN30 call as follows:

```
CI> CN,127,30B,020137B
```

But when I do this, I get the following error:

TABLE 1

## Terminal Configuration Format in DVPI

Bit 15, PM, page marker bit

1 = Writes escape underscore on end of each write

0 = Normal

Note: This bit tells the driver to append a nondisplaying terminator at the end of each write. It is set using an EXEC 3 with function code 44B.

Bit 14, ASCII bit

1 = 8 data bits (Katakana, Roman 8)

0 = 7 data bits (Normal, vs ASCII)

Bit 13, Termination bit

1 = Binary read only terminated by char count

0 = Binary read terminated by count or "CR"

Bits 12 - 6, Not used

Bit 5, FB, Flush Input Buffers (Multiplexer)

1 = Flush both MUX input buffers before issuing a terminal status request (CN 25B)

0 = Do not flush MUX input buffers before issuing a terminal status request

Bit 4, SE, Suppress Transmission Error Message (Multiplexer)

1 = Suppress issuing transmission error message in case of a buffer overflow on this port

0 = Do not suppress issuing transmission error message in case of a buffer overflow on this port

Bit 3, Page strapping bit

1 = page strapping

0 = line strapping

Bit 2, LF, controls Line feed for special character *CR*, if echo bit set in control word (required for multiplexer operation)

1 = Disable line feed (the MUX firmware takes care of line feed)

0 = Enable line feed

Bit 1, FF, contains status of terminal Form Feed

1 = Form feed enabled for terminal

0 = Form feed not enabled for terminal

Bit 0, ENQ, contains status of ENQ/ACK Handshake

1 = ENQ/ACK handshake enabled

0 = No ENQ/ACK handshake

Do not use Bit 0 to enable ENQ/ACK when using DD\*00 with MUX driver IDMO0. Bit 7 of CN30B should be used on the MUX.

I/O device error on LU 127

The reason is:

Invalid Request ( Bad Parameters )

Request has been flushed

What am I doing wrong?

**A:** What is not clear here is that by itself the 12040D MUX cannot do any modem control. All eight ports on the MUX have only pins 2, 3, and 7 active. The modem control lines, 6(DSR), 8(DCD), and 20(DTR), are all jumpered together in the panel, as are 4(RTS) and 5(CTS). Since there is no modem control available, you cannot set bit 13 (the modem bit) in the CN30 ini-

tialization command. A note in the *Driver Reference Manual* makes mention of this limitation. Modem control is available only on the A400 OBIO (ports B and C), the 12005 ASIC card, and a 12040D with a 37214A modem card cage. The 37214A is a long-obsolete card cage that takes the place of the 12040D 8 port MUX panel and allows the use of various internal and external modems and terminal connections. It has modem control capability.

Since modem control is not available on the 12040D MUX by itself, connecting a modem requires no special configuration. The port should be initialized as if a terminal were connected, and the modem is then connected using a 2/3 swap cable. The modem should be configured to assert DSR always. It is up the user to disconnect the line manually when logging off. HPMDM cannot be used since modem control is not active, and HPMDM requires this.



**Q:** What is RMTERM?

**A:** RMTERM is a Remote Virtual Terminal program for A series systems.

It has two main functions:

1. It allows serial access from a 10240D MUX port on a host system to a remote system via RS232. The remote system can have either a 12005, 12040A/D MUX, or OBIO. When you run RMTERM from the host, you become a virtual terminal to the remote system, through the D MUX on the host CPU. The remote can actually be any computer you wish to communicate with. I have often used RMTERM to dialout a modem on my RTE-A system to connect to a remote computer.
2. It allows downloading of memory-based op-systems from a 12040D MUX on a host system to a 12005 or OBIO, VCP-enabled, port on a remote system. The remote system must have a 12005 or OBIO because RMTERM makes use of the %BCT command from VCP, which is not supported on the 8-channel MUX.

### How to Use RMTERM

When you run RMTERM, you specify the LU for the communications link, and the baud rate. For example,

```
CI> rmterm,126,9600    LU 126 is port six on the MUX &
                        9600 baud.
```

*Caution:* Do not run RMTERM from the VCP terminal on the host; RMTERM needs the break key for its own purpose. You don't want to halt the host. Either use a nonsystem console terminal, or disable BREAK on the CPU.

RMTERM then gives you a header showing the LU you are using and the baud rate.

If you are connected to the VCP interface of a remote A Series, you are now the VCP terminal on the remote. You can execute any VCP command, such as booting the system.

To perform a download of a memory-based op-system to the remote from the host, use the following:

```
CI> rmterm,126,9600    >>>> Run RMTERM
```

Hit break on the terminal. You now have the following four options:

1. B = Break remote
2. L = Leave RMTERM program
3. D = Download to remote
4. Any other character to continue RMTERM

To do the download, type:

B <cr> (to make sure the remote computer is in VCP mode)

Now hit break again, and type:

D <cr>

RMTERM then prompts for the following:

Type 1 file to download

Enter a type 1 filename resident on the host.

Select code to boot from

Enter the select code of the IO card in the remote.

RMTERM now tells you it has started the download and gives the time of day and the memory size in blocks that is being downloaded.

Downloading ARSTR took less than 5 minutes at 9600 baud.

### Points to Remember

1. RMTERM works only *from* a 12040D MUX or A400 OBIO MUX. Both the terminal executing RMTERM and the communications port must be a D MUX or OBIO.
2. For virtual terminal operation, remote can be 12005, OBIO, or 12040A/B/C/D MUX, or just about any other computer.
3. For downloading, remote must have a 12005 or an OBIO (A400), enabled for VCP. This is because the download makes use of the %BCT command from VCP, and the MUX has never supported loading from cassette tape.
4. Documentation for RMTERM can be found in the *RTE-A Driver Reference Manual*, Appendix I.
5. RMTERM source code is shipped with RTE-A software and can be customized for use with other computers or black boxes.

**Q:** What utilities are available for downloading ASCII files via the 12040D MUX besides KERMIT or XMODEM?

**A:** RMTERM can be used in conjunction with a contributed program called UDOWN to download ASCII files via 12040D MUX. Binary files can be downloaded by UUENCODEing them first, then using UUECODE after they have been transferred.

RMTERM is used to establish a remote connection via MUX, and then UDOWN is used to perform the file transfer after configuring the remote MUX port as described in the help file.

The following is a description of UDOWN:

#### *UDOWN.hlp*

UDOWN is a simple program used to transfer files to a remote HP 1000.

Text files can be transferred directly and binary files can be transferred by use of the UUECODE and UUECODE programs.

UDOWN's main virtue is that it does not require anything special on the receiving end, other than a CI command file that is simple enough to be entered via the console.

This is an example of the command file needed on the receiving end of the link used by UDOWN:

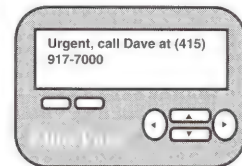
```
* Download.cmd      Rev.6100    ANT    <951214.1552>
* This command file is used to configure the 8-channel MUX port
* for use with UDOWN, the UUENCODE DownLoad utility. A MUX port
* is required, as the FIFO is needed to keep up with the
* incoming data. Edit the file as needed to specify the correct
* LU for the MUX port that you are using.

cn $LU 21b          ,,,, turn off prompt
cn $LU 34b 5        ,,,, CPU-CPU + Xon/Xoff
cn $LU 33b 100000b   ,,,, FIFO enabled
sport $LU           ,,,, just to verify that all is well
co $LU /scratch/pu_me.uu d ,,,, and do the copy
* <--- sending end runs UDOWN here --->
uudecode /scratch/pu_me.uu ,,,, decode from uu format
pu /scratch/pu_me.uu ,,,, clean up a bit
```

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*Walt Boeninger works in the HP Response Center in Mountain View, California. He has been supporting the HP 1000 for 15 years. His e-mail address is [walt@hpwr-cxe.mayfield.hp.com](mailto:walt@hpwr-cxe.mayfield.hp.com)*





## Industry Watch

THE GIGA-FLOPS WERE FLYING this past winter with the announcements of several new offerings for the technical computing crowd.

SGI claimed leadership (in number of installations, presumably) with its POWER CHALLENGE array shared-memory, multiprocessor system. The company says that its distributed approach to high-performance parallel computing allows application developers to avoid restructuring and partitioning applications to focus rather on the higher-level concepts and constructs of the application. So far, SGI claims to have 125 installations, which certainly indicates it's a popular choice. The largest of these—a 128-processor array—puts out 26.6 GFLOPS according to published reports.

Digital unveiled eight AlphaServer 8400 systems with a total of 96 Alpha 64-bit processors. Digital claims to have the affordable solution for compute-intensive, technical applications by taking advantage of standard, high-volume, low-cost components. The system uses commodity hardware and software components, along with a PCI bus that provides 100 Mb/s memory-to-memory communications with a latency of less than 5 microseconds. The company says this approach allows the eight AlphaServers to operate as a single system, delivering 57.6 GFLOPS of computing power. It comes with a nice price of \$4.5 million.

That's also not a bad price lined up with a \$40 million Cray T3E, although the Cray knocks out a whopping 600 GFLOPS for a 1024-processor system. Every part of the system is supposed to scale with the number of processors (they use the DEC Alpha EV5 64-bit RISC processors). In maximum configurations—that would be 2,048 processors—Cray claims the T3E will have a peak performance of up to 1.2 tera-FLOPS. Whewwww.

Getting back down to earth, HP gets you into supercomputing for under a half million with its HP 9000 Model EPS20 Enterprise Parallel Server—which the company says is a truly cost-effective alternative to supercomputers. Using the shared-memory approach, the EPS20 supports multiple SMP nodes and is scalable to support increasingly compute-intensive technical and commercial applications. Based on HP's 120-MHz PA-7200, a 16-processor system delivers 4 GFLOPS for a mere \$456,000.

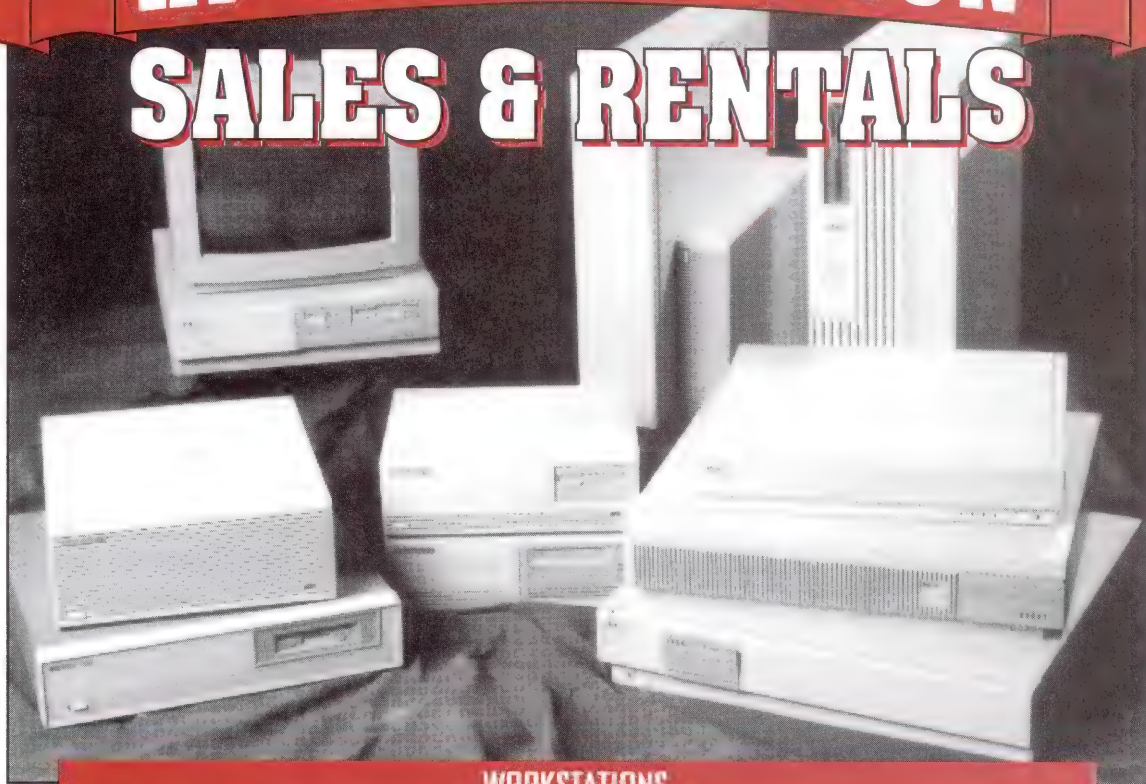
From supercomputing to super price/performance, SGI and Digital were going for the records, each claiming victory after a fashion. SGI announced that it holds the Informix database performance record by achieving a TPC/C benchmark result of 6,313.78 transactions-per-minute. They ran the Informix system on a 16-processor CHALLENGE XL SMP server, which has a 36-processor maximum configuration. These results blasted Sun's old record of 3,534.20 TPM/C, and at lower cost—\$481 per TPM/C for SGI vs. \$495 per TPM/C for Sun.

Digital was flying high, too, claiming a price/performance record for its AlphaServer 2100 5/300 running Microsoft Windows NT. This combo produced results of 3,194.4 TPM/C at an unheard-of \$196 per TPM/C. The company claims this price/performance beats out any nearest competitors. The cost per TPM/C reflects the cost of acquisition and ownership of the system over a five-year period, including hardware and software maintenance, software upgrades, and extended warranties. ■

*James H. Gamble is a freelance writer and communications consultant for technology-based products and services companies. He can be reached by phone at 603-673-1904 or by e-mail at [jhg@mv.mv.com](mailto:jhg@mv.mv.com).*

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# New Products

## Backup

Unison Software has announced Version 2.0 of its RoadRunner backup system. RoadRunner 2.0 offers an enhanced GUI, improved network performance, HP OpenView OperationsCenter integration, expanded device support, and backup to disk files.

RoadRunner can now back up to or restore from up to 32 parallel tape drives. Backup and recovery of data over the network has been improved, giving users network transmission throughput gains of up to 100 percent over previous versions of RoadRunner.

Contact Unison Software, phone: (408) 988-2800, fax: (408) 988-2236, e-mail: [info@unison.com](mailto:info@unison.com), WWW: <http://www.unison.com>.

## Easy Color Printing

AutoGraph International (AGI) has announced FleXprint printer management software, which provides versatility and high-speed printing while guaranteeing compatibility with all current and future Adobe PostScript level 2 printers. With push-button control of printer features, FleXprint provides the ease of use previously known only with PC or Macintosh drivers. The Motif GUI gives the user full control of printer fea-

tures including print quality, tray selection, and EasyColor color correction. A "fast print" button allows for a quick screen hardcopy.

FleXprint software is supplied on a CD-ROM. A single-user price starts at \$695.

Contact AutoGraph International, Inc., phone (408) 436-7227.

## CD-ROM Recording

Young Minds Inc. has announced the Mass Production System, a new CD recording system that premasters and records as many as 100 different CD-ROM discs in a single day. The MPS system uses Kodak PCD 600, which can record 650 MB of data onto a recordable disc in 12 minutes.

MPS pricing begins at \$69,950. Price includes the MPS controller, premastering software, the Kodak PCD 600, and Disc Transporter.

Contact Young Minds, Inc., phone: (800) 964-4964 or (909) 798-0488, e-mail: [marketing@ymi.com](mailto:marketing@ymi.com), WWW: <http://www.ymi.com>.

## System Management

PLATINUM technology, inc. has announced that it will integrate its system management solutions with HP OpenView OperationsCenter. These

### Correction Notice

In the November issue of *hp-ux/usr*, the New Products announcement for TriTeal Corporation's TEDsecure ("CDE Security Feature," page 106) stated, "TED and TEDsecure are available on all versions of UNIX for a list price of \$425."

TED, or TriTeal's implementation of CDE, sells for \$425. TEDsecure, the security feature, is an additional \$200.

We apologize for any inconvenience this error has caused.

For more information on TED or TEDsecure, contact TriTeal, phone: (619) 930-2077, fax: (619) 930-2081, e-mail: [info@triteal.com](mailto:info@triteal.com).

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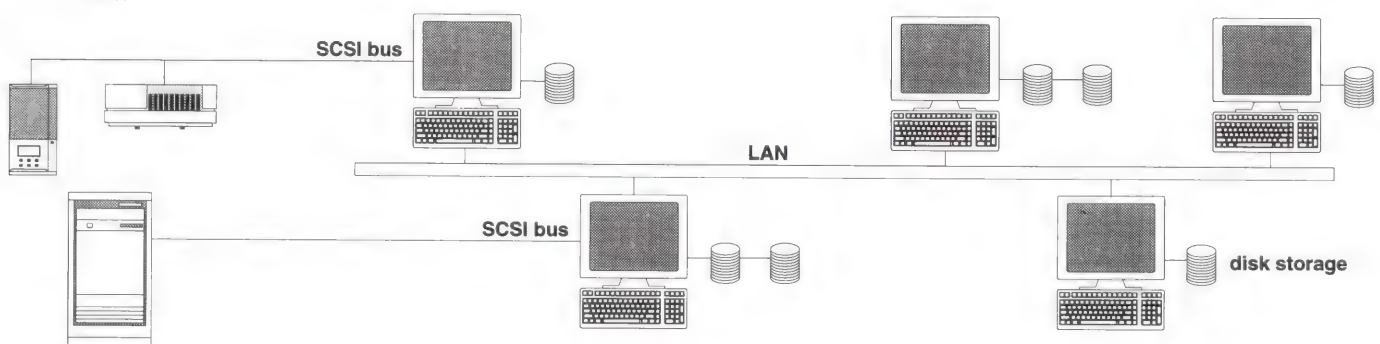
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CIRCLE 157 ON READER SERVICE CARD



### SCSI Modem Server

Central Data Corporation has introduced the scsiModem Server, reportedly the first PCMCIA-based modem server to use the SCSI interface. The scsiModem Server integrates up to 16 PCMCIA fax/modems in a single chassis and supports SLIP and PPP on the UNIX host.

Each scsiModem Server attaches via the Standard SCSI bus, without opening the system cabinet or consuming a card slot. It uses only one SCSI ID, quietly sharing the SCSI bus with other SCSI peripherals.

The SM-5008 provides eight Type II PCMCIA slots, while the SM-5016 has sixteen Type II slots. Both 14.4-Kb and 28.8-Kb PCMCIA fax/modems are supported. The servers use FLASH EPROMs for fast and easy firmware upgrades in the field.

The SM-5008 is priced at \$1,695, and the SM-5016 is priced at \$2,395.

Contact Central Data Corporation, phone: (217) 359-8010 or (800) 482-0315, e-mail: markd@cd.com.



**SCSI  
Modem  
Server**

version of Source Code Manager (SCM). SCM is UniPress' comprehensive configuration management for managing the source and binary files of

multiprogrammer projects.

Although SCM Lite is a single-user product, the user can make multiple "working copies" of an SCM project for his own use. These working copies allow the user to control more than one version of source code at the same time (e.g., a development copy and a test copy).

SCM Lite is available for HP 9000s and other computers. SCM Lite is free from the Web ([http://www.unipress.com/free\\_evals](http://www.unipress.com/free_evals)) or the UniPress ftp site ([ftp://unipress.com/pub/free\\_evals/directory](ftp://unipress.com/pub/free_evals/directory)).

SCM is priced at \$1,295 for one user, \$4,995 for five, and \$7,995 for ten.

Contact UniPress Software, phone: (908) 287-2100, fax: (908) 287-4929, e-mail: [info@unipress.com](mailto:info@unipress.com).

### Error Detection

Compuware has announced Fault-XPERT, a tool to automatically detect and diagnose application, system, and transaction errors. At the same time the end user sees an error message, Fault-XPERT will alert the support team through electronic mail or a pager and deliver details on the error. It will immediately produce an easy-to-read diagnostic summary.

Fault-XPERT provides immediate detection and analysis of HP 9000 application and CICS 9000 transaction errors.

Contact Compuware, phone: (810) 737-7300.

offerings are Apriori, PLATINUM's automated problem resolution/management system; PLATINUM Xfer, which distributes software to nodes across an enterprise and collects data from these remote nodes; DBVision, which monitors and manages performance of Oracle and Sybase databases in distributed UNIX environments; ServerVision, which monitors and manages performance of UNIX servers in distributed environments; PLATINUM Safe, for data security management; NetArchive, for file backup and Hierarchical Storage Management; and PLATINUM AutoSys, an automated job scheduling and job management tool.

Integration is scheduled for completion during the second quarter of 1996.

Contact PLATINUM technology, inc., phone: (708) 620-5000, fax: (708) 691-0710.

### New From UniPress Software

#### Automatic Documentation

UniPress Software, Inc. has announced HTML and MS Word.RTF sup-

port in GEORGE, an automatic internals documentation tool for software engineers developing in C and C++.

GEORGE provides automatic creation of internals documentation from users' source code into FrameMaker, Interleaf, and now Web HTML and MS Word.RTF formats. Documents created by GEORGE are automatically hypertext integrated, allowing direct online access to documentation and source code with fast navigation across the code base. It provides for automatic indexing of the code and automatic output that can be supplemented by user text, graphic, and table information. In addition, GEORGE merges prior user additions into new documents, automatically reporting any differences.

GEORGE is priced at \$5,000 for a single UNIX workstation and \$7,500 for a five-pack.

#### Configuration Management and Version Control

UniPress Software, Inc. has announced SCM Lite, a free, single-user

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### **New From Robelle Consulting, Ltd.**

#### *Full-Screen Editor*

Robelle Consulting Ltd. has announced the newest version of Qedit for HP-UX. Qedit/UX is modeled on Robelle's Qedit for MPE. With Qedit/UX Version 4.4, Robelle offers Browse mode to protect files from unplanned changes, as well as greater flexibility in editing several files at the same time. In addition, all these features are compatible with the latest upgrades to HP-UX 10.0.

Qedit now makes it easier to work with several files at once. The New command creates a scratch file. The Verify Open command shows the names of the nine most recently opened files. A simple Open \*-1, \*-2, and so on, immediately opens the chosen file; when used at the full screen command line, this command immediately displays the file's current screen. Browse mode allows the user to look into files but does not allow modifications, and does not update the file's modification date.

These enhancements to Qedit are compatible with the latest changes to HP-UX 10.0.

#### *Data Extraction*

Robelle Consulting Ltd. has announced the Suprtool data extraction utility for HP-UX. Suprtool/UX reads and writes fixed-length data files, selects records based on flexible criteria, and sorts them quickly using Robelle's fastsort technology. Suprtool has been available for over ten years on HP's MPE platform.

Users of Suprtool/UX can turn to the accompanying online Help, or they can take advantage of the Microsoft Windows WinHelp files included with their copy.

CIRCLE 140 ON READER SERVICE CARD

hp-ux/usr ■ march 1996

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Contact Robelle, phone: (800) 561-8311 or (604) 582-1700, fax: (604) 582-1799, e-mail: [info@robelle.com](mailto:info@robelle.com), WWW: <http://www.robelle.com>.

### Distributed Software Management

NOVADIGM, Inc. has announced the Enterprise Desktop Manager (EDM) for managing distributed software configurations using HP-UX and AIX-based management servers and new client managers for NetWare and UnixWare. EDM now provides large enterprises with a standard software management infrastructure for automatically deploying and changing client-server software versions across 16 platforms.

Pricing for EDM starts at \$20,000 for the management server and \$200 per client.

Contact NOVADIGM, phone: (201) 512-1000, fax: (201) 512-1001.

### Network Security

SecureWare, Inc. has announced Hannah, which is designed for use by companies conducting business over public and local-area networks. This software-based network security solution provides end-to-end authentication, complete access control, strong integrity protection, confidentiality, and full audit capabilities on all hosts that need protection, without requiring modification to any applications.

Hannah authenticates both sides before determining whether or not to allow a connection. It is easily administered and managed from a single point

of control.

Contact SecureWare, phone: (404) 315-6296, fax: (404) 315-0293.

### Data Warehousing

SAS Institute has announced the "Orlando" release of the SAS System for Data Warehousing. New access support assists in populating the data warehouse repository by increasing options for getting to legacy data. Extended connectivity support for APPC on Solaris, HP-UX, AIX, and Windows increases access to legacy data in traditional IBM mainframe environments. New access to IDMS and IMS databases on the mainframe is also provided, and OLE 2.0 is supported within Windows.

The first-year license fee for base SAS software ranges from \$985 for one work unit to \$49,125 for 1,000 work units. Renewals are available at a lower rate.

Contact SAS Institute, phone: (919) 677-8000.

### Database/Mailing List Management

Group 1 Software has announced List Conversion Plus Version 1.0 for the HP 9000 and other platforms. Previously available for use only with IBM and compatible mainframe and midrange computers, List Conversion Plus allows users to convert mailing lists and data files into user-defined, customized formats without computer programming. Users can place floating address lines in fixed locations and separate city-state-ZIP information into consistent parts. The system can reject or select records based on any data in the input record.

List price for List Conversion Plus is \$15,000.

Contact Group 1 Software, phone: (800) 368-5806, ext. 383, fax: (301) 731-0360.

### RAID Tape Array Controllers

Ultera Systems has announced Striper tape array controllers, which enable arrays of tape drives or stackers to operate at effective speeds that are two to four times that of a single tape drive. The new controllers can stripe data onto two or more drives, which results in a tape array that can be addressed as a single tape drive but has several times the capacity and apparent speed. The controllers also can manage mirroring operations (recording one or more duplicate copies simultaneously), for making multiple backups of critical data.

Ultra Striper controllers are compatible with most current tape technology, from 8-mm to DAT to DLT or reel-to-reel.

The Striper controllers are available in board form factor (Model 101) or with enclosures (Model 901). Prices begin at \$4,500 in OEM quantities.

Contact Ultera Systems, phone: (714) 367-8800, fax: (714) 367-0758, e-mail: [inform@ultera.com](mailto:inform@ultera.com).



**Striper Tape Array Controller**

## Open Business Software

JBA International has announced System 21, which allows users to run the same applications on an AS/400 or UNIX platform. System 21 centers around the reengineering of JBA's Business 400 financial, manufacturing, customer service and logistics, and service management software for open, client-server, and object-oriented operation. System 21's architecture enables its applications to run on UNIX-based IBM, HP, and DEC platforms and still support the AS/400.

The company has produced hundreds of libraries of reusable object classes and new graphical modules of System 21. System 21 graphical application modules can be used alongside existing character-based technology.

Contact JBA, phone: (800) JBA-INTL, fax: (609) 439-9652.

## Enterprise Messaging

Siren Software has announced Siren Mail 3.0 for Macintosh, a client-server solution for sending and receiving e-mail messages, MIME (Multipurpose Internet Mail Extensions), and BINHEX attachments over the Internet. Siren Mail now operates across Macintoshes; PCs running Microsoft Windows 3.1, 95, or NT; X-Windows/Motif displays; and character terminals. Siren Mail's Address Book supports both client- and server-based data repositories. Support for the IMAP protocol provides a true client-server messaging solution.

Siren Mail Client for Macintosh is priced at \$100 per user. Siren Mail Server is available for the HP 9000 and other servers. It is priced at \$2,995.

Contact Siren Software, phone: (800) 45 SIREN or (415) 322-0600, fax: (415) 322-9999, e-mail: info@siren.com.

## Do You Know Where Your Security Holes Are? Find Them with SecurityAudit/UX!

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EVEN IF YOUR SYSTEM IS SET UP CORRECTLY (AND HOW WOULD YOU KNOW IF IT WAS?) AND HAS NO SECURITY LOOPHOLES, IT CAN BE VERY DIFFICULT TO MONITOR SYSTEM CHANGES, AND TO ENSURE THAT SECURITY ISN'T COMPROMISED. THE MAGNITUDE OF THE PROBLEM INCREASES AS THE TOTAL NUMBER OF USERS CONFIGURED AND THE TOTAL NUMBER OF FILES GROWS. IT'S EASY FOR ORDINARY USERS TO CHANGE THE SECURITY OF THEIR OWN FILES TO ALLOW OTHERS TO ACCESS THE CONTENTS. A LOOPHOLE LEFT BEHIND INADVERTENTLY OR ON PURPOSE MAY BE EXPLOITED BY A DISGRUNTLED EMPLOYEE OR A HACKER TO BREAK SYSTEM SECURITY, SOMETIMES MUCH LATER.

**SecurityAudit/UX** PRODUCES OVER 40 REPORTS, CONTAINING DETAILED INFORMATION ON THE FOLLOWING CLASSES OF PROBLEMS:

- **User and Group-related problems, including weak passwords and non-unique identification numbers.**
- **File-system related problems, including historical tracking of files and detection of potential Trojan horses.**
- **PDF-related security problems, extended to detect changes in ACL specifications.**
- **Logging subsystems status display, and logfile analysis.**
- **Network-related status display and configuration weaknesses.**

**SecurityAudit/UX** RUNS ON ALL HP-UX BASED 9000 SERIES 700 AND 800 SYSTEMS, AND HAS BEEN SPECIFICALLY TAILORED TO ADDRESS PECULIARITIES OF HP-UX, SUCH AS PDF, ACL AND HP'S SHADOW PASSWORDS.

**Call EUGENE VOLOKH for more info!**



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## Table Widget

KL Group Inc. has announced XRT/table Version 2.2, a multipurpose widget that enables Motif developers to build interactive tables into their applications. XRT/table Version 2.2 enables developers and end users to display and manipulate tabular data in OSF/Motif applications. More than 150 resources control how the table behaves and how data is displayed. New features include widgets in cells, Motif 2.0 compliance, automatic text word wrap, and the ability to mimic Motif widgets.

XRT/table can be used in conjunction with other KL Group products, including XRT/field, XRT/graph, and XRT/3d.

A single development license is \$1,495; licensing for a network is \$5,995. There are no run-time, royalty, or distribution fees.

Contact KL Group, phone: (416)

594-1026 or (800) 663-4723, fax: (416) 594-1919, e-mail: info@klg.com.

## Business Software

Uniplex Software, Inc. has announced Uniplex Business Software Version 8.10, which includes electronic mail, calendaring and scheduling, word processing, spreadsheet, business graphics, and relational database management. UBS 8.10 features a Windows-style File Manager for locating and managing shared documents and data; additional functionality, including automatic document format conversion and Windows terminal emulation; and newly incorporated products, which include a high-quality business graphics package and a graphical terminal emulator for Motif workstations.

Uniplex Business Software Version 8.10 is priced at \$346 to \$440 per user, depending on the number of users.



## X Terminal

Phase X Systems has announced a small-footprint X terminal, the SM series. The X terminal base unit is 9<sup>3</sup>/<sub>4</sub> inches x 9<sup>1</sup>/<sub>4</sub> inches x 1<sup>3</sup>/<sub>4</sub> inches—up to 60 percent smaller than traditional X terminals, Phase X notes. Energy Star monitors include 9-inch gray-scale up to 20-inch color, with resolutions ranging from 640 x 480 to 1,280 x 1,024. Models are based on different implementations of the powerful Intel RISC chip i960, from 25 MHz to 33 MHz.

The standard 4-MB RAM memory configuration can be increased to 64 MB, and a 4-MB flash memory option is also available. Ethernet interfaces using twisted pair, thin, or thick are available, as well as two serial ports and one parallel port. Pricing for a 9-inch monochrome or 14-inch color unit with a 25-MHz processor lists at \$1,395, with the high-end, 21-inch color system listing at \$3,595. Future options for the SM series will include audio capabilities.

Contact Phase X Systems, phone: (503) 531-2400, fax: (503) 531-2401, e-mail: info@phasex.com.



**X Terminal**

more advanced topics such as networking, the HP VUE and CDE interfaces, performance tuning, and shell programming. The guide also covers the System Administration Manager (SAM).

*The HP-UX 10.x System Administration "How-To" Book* (ISBN 0-13-125873-7) is priced at \$32.

## Portable Shell Programming

Prentice Hall and Hewlett-Packard Professional Books have announced *Portable Shell Programming Examples: An Extensive Collection of Bourne Shells*, by Bruce Blinn, reportedly the only book to focus exclusively on Bourne shells.

*Portable Shell Programming Examples* shows programmers how to use the Bourne shell as a programming language to develop shell scripts. The book contains more than 250 major shell programming examples (in standard Bourne shell, `/bin/sh`), supplying programmers with a reference to portable shell programming examples that are ready to use as templates in their programming. Included with the book is a diskette containing all of the shell examples. The examples will also be posted on the Prentice Hall ftp site.

*Portable Shell Programming Examples: An Extensive Collection of Bourne Shells* (ISBN: 0-13-451494-7) is priced at \$39.

Contact Prentice Hall PTR, phone: (201) 236-7139, fax: (201) 236-7131.

## C/C++ Tutorial

Prentice Hall PTR has announced an interactive, multimedia, CD-ROM-based C and C++ tutorial, the *C & C++ Multimedia Cyber Classroom*, by Dr. Harvey M. Dietel and Paul J. Dietel. The tutorial lets users learn C and C++ at their

true source/destination of sensitive data.

Contact Morning Star Technologies, phone: (800) 558-7827 or (614) 451-1883, fax: (614) 459-5054, e-mail: Marketing@MorningStar.Com.

## New from Prentice Hall PTR

### HP-UX 10.x System Administration

Prentice Hall and Hewlett-Packard Professional Books have announced *The HP-UX 10.x System Administration "How-To" Book* by Marty Poniatoski, a complete guide to system administration for HP-UX 10.x.

*The HP-UX 10.x System Administration "How-To" Book* picks up where Poniatoski's first book, *The HP-UX System Administrator's "How-To" Book*, left off. This new book details every aspect of HP-UX 10.x system administration, beginning with system setup and progressing to

Contact Uniplex Software, phone: (916) 985-8617, fax: (916) 985-6008, e-mail: 71744.3216@compuserve.com.

## Internet Security

Morning Star Technologies, Inc. has announced SecureConnect for UNIX, which combines Morning Star's Internet standard point-to-point (PPP) software with its advanced dynamic firewall packet filtering and virtual private networking (VPN) technology.

With dynamic packet filtering, the firewall is open only to the applications and services specified by a security policy. All other accesses are prohibited.

SecureConnect for UNIX's encryption feature enables organizations to safely use the Internet and allows users to create VPN. Encrypting data with Data Encryption Standard, SecureConnect's VPN uses destination-specific keys to hide the content and



own pace. This system works for programmers at all levels.

Coverage of every important C and C++ concept is based on the Deitels' #1 best-selling college textbooks, *C How to Program* and *C++ How to Program* (both Prentice Hall), and their corporate training classes.

*C & C++ Multimedia Cyber Classroom* (ISBN: 0-13-231374-X) is priced at \$69.95.

Contact Prentice Hall PTR, phone: (800) 947-7700 or (515) 284-6751, fax: (515) 284-2607, e-mail: [orders@prenhall.com](mailto:orders@prenhall.com).

### Data Analysis

Dimensional Insight has announced that its CrossTarget data analysis and decision support solution now features new searching, analysis, and presentation capabilities. In addition, a new module, called the DiveMaster, allows users to view data in multiple data models as if it were one big model.

Users may now easily add new dimensions, or categories of data, "on the fly." Colors are used to denote exceptions to consistent performance. The new Diver GUI also lets users save complex searches with easy-to-use agents called markers.

Pricing for a typical 10-user installation of Diver 4.0 is \$750 per user. The DiveMaster module is priced at \$3,500 per site for users who have installed the Builder data transformer and the Diver.

Contact Dimensional Insight, phone: (617) 229-9111, fax: (617) 229-9113.

### Open Systems Security

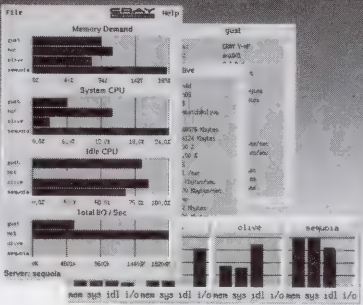
Memco Software Inc. and CyberSAFE Corporation have

announced the integration of Memco's SeOS (Security for Open Systems) with CyberSAFE's Challenger. This technology solution secures corporate data and systems against unauthorized access and disclosure from internal as well as external sources, providing

proactive, preventive network and server security that is easy to administer and transparent to the end user.

Challenger is a Keberos-based network security solution, which provides authentication and secured Single Sign-On, a secured way for managing and

## UNIX Workload Management Network Queuing Environment



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Contact CraySoft for more information at [craysoft@cray.com](mailto:craysoft@cray.com).  
You can also phone us at 800-BUY-CRAY, or +1 612-683-5230.  
Or visit our Web Page at <http://www.cray.com/craysoft>

# CRAYSOFT

CIRCLE 60 ON READER SERVICE CARD

### Sybase Performance Analysis

The Database Solutions Company has announced DBScope Version 2.0 for Sybase, a stand-alone module of its Total Performance Management suite. DBScope is a PC-based tool capable of monitoring any Sybase database. The user can drill down on user/session information, SQL area information, locking, device and transaction activity, etc., to solve specific transactional performance issues. DBScope will improve the efficiency of Sybase System 11 by identifying problem areas early and suggesting possible solutions to the DBA.

DBScope for Sybase is fully integrated via drag-and-drop in the PC Windows environment with DBTune 5.0 for Sybase, an automatic tuning tool developed by The Database Solutions Company.

DBScope Version 2.0 is priced starting at \$995 for a single-node license.

Contact The Database Solutions Company, phone: (800) 933-7668 or (804) 794-0354, fax: (804) 794-0813.

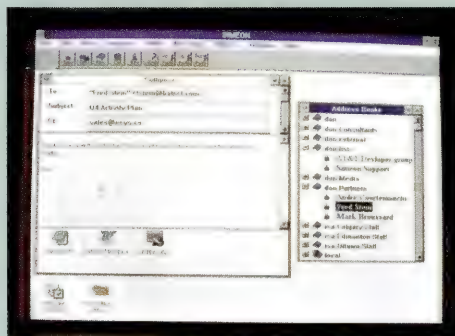


## Internet Communication

The ESYS Corporation and Carnegie Mellon University have announced Simeon 3, a commercial, standards-based, client-server e-mail application for the Internet. Simeon 3 implements two Internet mail protocols—Internet Message Access Protocol (IMAP) and Internet Message Support Protocol (IMSP)—that resolve client mobility, scalability, and administrative issues.

Simeon 3 provides true universal access to messages, folders, address books, and user preferences, regardless of operating platform or location on the network; selective access to some, all, or parts of messages, whether stored locally or on the server, minimizing network traffic; shared access to folders and address books; scalability to 100,000 users or more; multiple folders and address books stored locally, on the server, or both; the ability to send application documents from word processors and spreadsheets to graphics and application binaries; and access to non-e-mail data, such as Internet News.

Contact The ESYS Corporation, phone: (403) 424-4922, fax: (403) 424-4925, e-mail: Don.McCormick@esys.ca.



Simeon 3

## Internet-Enabled Electronic Commerce

Sterling Software, Inc. has announced several services to provide an EC fast track to the Internet and an EC foundation for the World Wide Web. Both facilitate secure electronic trading relationships via the Internet in conjunction with Sterling Software's Network Services Division.

Sterling Software's COMMERCE: Connection for Windows, a PC-based suite of electronic commerce-related software products, has been enhanced to allow for easy, secure exchange of EDI-standard documents and other information using any standard dialup or dedicated Internet connection. The information will be processed by COMMERCE:Network, a reliable, secure means to conduct critical business transactions.

Contact Sterling Software, phone: (614) 793-7000, e-mail: dave\_kishler@sterling.com.

Contact Sterling Software, phone: (614) 793-7000, e-mail: dave\_kishler@sterling.com.

## New From HP

### HP 9000 D-Class Server

HP has announced the the HP 9000 D-Class SMP server. The D-Class is intended to offer leading price/performance in the entry-level RISC/UNIX marketplace. The D-Class is said to offer better performance than a Compaq Proliant 4500 high-end PC and other high-end PC servers.

Beginning at a typical street price of \$6,400 and including a new three-year, next-day, on-site limited warranty, the D-Class offers three times the performance

## Project Management

Digital Tools has announced AutoPLAN II 3.0, Project Management for Workgroups. AutoPLAN II 3.0 is simple to install and easy to use. Projects can be distributed across an organization to be electronically linked at the activity level. Resource pools allow managers to balance shared resources across multiple projects.

Automatic triggers can be placed within projects to notify team members of key events as they occur. Triggers can send messages to the AutoPLAN II 3.0 Inter-Project Bulletin Board system or directly to the Internet. Users with HTML level 2 or 3 Web browsers can access AutoPLAN II 3.0 online documentation as well as link directly to the Digital Tools WWW home page and FTP site.

AutoPLAN II 3.0 is priced from \$1,495.

Contact Digital Tools, phone: (408) 366-6920, fax: (408) 446-2140, e-mail: info@digit.com.

restricting access to multiple computer platforms. SeOS provides host security, controlling what assets a user can access once logged in.

Pricing begins at \$15,000.

Contact Memco Software, phone: (212) 286-8820 or (800) 862-2602, fax: (212) 286-9150, e-mail: memco@memco.com.

## Tcl and Tk Pocket References

Specialized Systems Consultants, Inc. (SSC) has announced the Tcl Pocket Reference and the Tk Pocket Reference. Tcl (Tool Command Language) is an embeddable, extensible scripting language. Tk is a toolkit for the X-Window System. When Tcl and Tk are used together, the Tcl/Tk programming system can be used to rapidly build X front ends to applications.

The Tcl and Tk Reference are sold individually for \$3 each or together as a package (ISBN: 0-916151-80-8) for \$4.50.

Contact Specialized Systems Consultants, phone: (206) 782-7733, fax: (206) 782-7191, e-mail: sales@ssc.com.

## DOS and UNIX File Conversion

Cactus International has announced the DOS-TAR TOOLKIT. The DOS-TAR program enables full file conversion between DOS and UNIX. This is useful for restoring files on a PC from a tape that was created using the UNIX tar format on 4-mm, 8-mm, or QIC-02 tape. It now also comes bundled with the SCSI and QIC-02 drivers, the Data Transformer, and more than 60 UNIX utilities ported to DOS.

The Data Transformer is a DOS application that facilitates data transfer between various devices on the system, without regard to file format. It can be used in conjunction with user-defined filters to enable custom data conversion.

The DOS-TAR TOOLKIT is priced at \$250.

Contact Cactus International, phone: (301) 829-1622 or (800) 525-8649, e-mail: [info@cactus.com](mailto:info@cactus.com), WWW: <http://www.cactus.com>.

of IBM's RS/6000 E20, with more than 50 percent better price/performance. It boasts twice the performance of Sun's SS20/712, with more than 60 percent better price/performance.

Powered by HP's PA-RISC 7100LC and 7200 processors running the enterprise-class HP-UX 10.01 operating system, the new servers offer a path to faster generations of HP's PA-RISC processors and two-way symmetric multiprocessing (SMP) by simple board upgrades.

The D-Class family also includes other advanced high-availability features found only in larger systems, including CPU failover protection for automatic restart and deconfiguration; automatic memory page de-allocation to block memory corruption; hot plugging of internal disk; soft power-off for graceful shutdowns in the absence of an uninterruptible power supply; a multichannel input/output

subsystem for higher throughput; and RAID storage support.

The D-Class also features advanced memory interleaving, or multiple paths to memory, for decreased likelihood of memory bottlenecks. The processor memory bus features high-speed I/O, which provides 160 megabytes per second. Expandability to two channels provides for a total of 320 megabytes per second.

The HP 9000 D-Class servers are orderable now. List prices begin at \$8,050 for an entry-level system that includes one PA-RISC processor, 32 MB of memory, 1 GB of internal disk, a SCSI-2 interface, a CD-ROM drive, local area networking interfaces, and a client-server HP-UX 10.01 license.

### HP 9000 Web Server

HP has introduced the HP 9000 Web Server, which is intended to

Volt Services Group is a recognized leader in the Computer and Information Technologies Industries. Volt, a full-service company, specializing in long-term employment opportunities, has been awarded a national contract with **HEWLETT-PACKARD** establishing us as a preferred supplier of Computer and Technical Professionals. Our corporate philosophy is well defined with consistent policies & procedures. Through teamwork, we will consistently provide services and business practices that meet and exceed both internal and external customer and employee expectations.

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enable users to quickly and easily improve communication internally and externally. Aimed at Sun Microsystems' installed base, the HP 9000 Web Server—based on the recently announced HP 9000 D-Class server and including Netscape Commerce Server software—delivers twice the price/performance of Sun's comparably configured Netra server Model i600 running Netscape Communications Server software, according to Webstone 1.1 benchmarking.

HP is further targeting Sun's installed Netra customers by offering incentive products and services designed to help Sun customers migrate to the HP 9000 Web Server easily and cost effectively. Customers will receive an extra 5 percent savings over standard trade-in program discounts that range up to 15 percent when they trade in Sun or Sun-



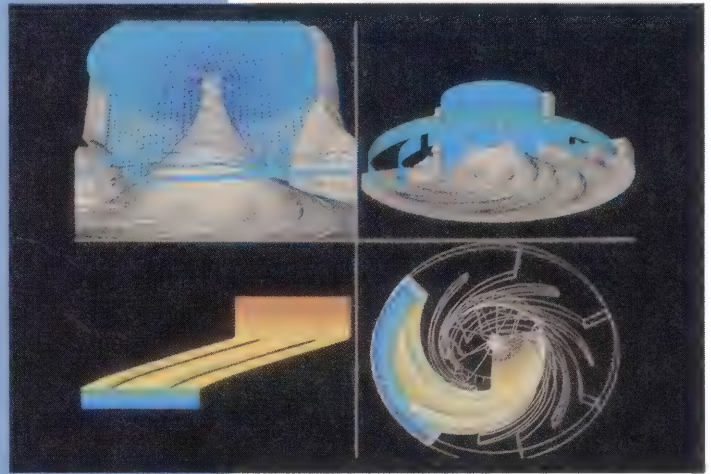
### Distributed Engineering Postprocessor

Computational Engineering International, Inc. (CEI) has announced EnSight 5.5, the distributed engineering postprocessor. The release is immediately available for workstations and servers from HP and others. Version 5.5 provides several major enhancements in capability, including the ability to postprocess and animate up to eight datasets simultaneously. These sessions (or "cases") can run locally or on remote compute servers.

Version 5.5 provides clipping against quadric surfaces such as cylinders and cones as well as clipping to an arbitrary surface of revolution. Interactive probes provide dynamic feedback during mouse manipulation.

Pricing for commercial users starts at \$8,000. Academic licenses start at under \$1,000.

Contact Computational Engineering International, phone: (919) 481-4301, fax: (919) 481-4306.



compatible workstations or servers and purchase HP workstations or servers.

The HP 9000 Web Server line is based on the recently announced HP 9000 D-Class symmetric multiprocessing (SMP) servers, which are powered by up to two of HP's PA-RISC processors and HP-UX 10.01.

The HP 9000 Web Server comes equipped with Internet access, electronic messaging, and PC integration capabilities. It also includes C2-level security and a SAM administration tool that helps ensure tight system security.

HP Channel Partners offer optional search engines, development tools, firewalls, and Web server software. HP's channel partners include more than 50 "best-in-class" Internet software providers, HP notes.

The HP 9000 Web Servers begin at \$10,380 for an entry-level system that includes one PA-RISC processor, 32 MB of memory, 1 GB of internal disk, a CD-ROM drive, a LAN interface, and a client-server HP-UX 10.01 license with Netscape Commerce Server preinstalled. The new systems are available now and include a three-year on-site limited warranty.

### Windows Access Solution

HP has unveiled Version 1.1 of its HP 500 Windows Application Server, which supports Windows 95 and 32-bit PC applications, as well as other new enhancements. The HP 500 Windows Application Server, available since August 1995, enables users who primarily run UNIX system-based applications to access Windows personal productivity tools, such as word processing, presentation packages, and e-mail from their UNIX desktop.

HP 500 version 1.1 provides support for Windows Enhanced Mode (386/486 mode) and executes MS Windows applications in native mode on Intel-based platforms for maximum PC application compatibility. Additional features include support for Windows 16-bit applications and Windows 3.x GUI.

In the second half of 1996, the HP 500 software is scheduled to provide complete Windows 95 support. Users will gain transparent access to full 32-bit applications, as well as 16-bit applications running in native mode, using a full implementation of Windows 95.

HP 500 Version 1.1 today offers performance of 486/33 MHz or higher for

each individual user, with load-balancing capability between HP 500 servers. In the second quarter of 1996, the HP 500 is scheduled to provide enhanced multiprocessing support with 486/50-MHz performance for each individual user. Later in the year and beyond, HP 500 performance is slated to further increase to 486/66 MHz and higher per user as HP closely follows Intel's scheduled transition from P5 to P6 chip releases. The HP 500 also is scheduled to provide support for the new Intel/HP architecture-based processors when they become available. In addition, load balancing between HP 500 servers will be further enhanced.

The HP 500 is designed without proprietary local clients, protocols, or operating-system extensions. It can work with any available X11-capable device and will continue to rely on networking standards such as TCP/IP, X, NFS, and NIS to ensure present and future compatibility with most networked environments.

The HP 500 is priced at \$7,995 for a 30-user software license.

### Color Graphics Cards

HP has announced new HCRX color-graphics cards that significantly increase the graphics performance of its HP 9000 Series 700i VMEbus product line.

The graphics cards work with HP's 743i 64-MHz and 100-MHz single-board

computers and HP's 748i 64-MHz and 100-MHz VME full-system workstations.

The eight-plane version, HCRX-8/VME, is one of the fastest GUI and 2D/3D vector graphics accelerators available. HP Color Recovery technology allows the simultaneous display of approximately 8 million colors instead of the usual 256 colors. Users can generate the image quality of a 24-plane system—without the grainy or patterned effect of 8-bit dithering—at the lower price of an eight-plane system.

HCRX-24/VME, the 24-plane version, offers double-buffered 24-plane graphics with eight overlay planes. HCRX-24's 192-bit internal data path provides extremely fast imaging operations and is designed for scientific visualization, animation, GIS, and design-analysis applications.

The VMEbus workstations run the HP-UX 9.X or 10.X operating systems and are compatible with the entire family of Series 700 PA-RISC-based workstations, allowing users to integrate existing systems and future configurations easily.

In addition, a library of more than 5,000 software applications for Series 700 workstations also can be used with VMEbus industrial workstations. HP-RT, HP's real-time operating system, also is available for the Model 743 VME single-board workstation.

The HCRX-8/VME is priced at 3,000. The HCRX-24/VME is priced at 4,500.

### 3D Graphics Workstations, Servers

HP has introduced what it claims are the world's fastest desktop 3D graphics workstations and announced a new enterprise parallel server that provides industry-leading price/performance.

HP's new C-class workstations, based on HP's PA-7200 processor, are priced from \$19,715 and deliver compute per-

formance of up to 167 SPECint92 and 269 SPECfp92 and 4.41 SPECint\_base95 and 7.45 SPECfp\_base95. HP VISUALIZE technology, which combines HP PA-RISC-based CPUs and on-board PA-RISC-based geometry accelerators, provides what is reported to be the fastest desktop graphics performance in the industry.

The new HP 9000 EPS20 Enterprise Parallel Server, priced from \$120,100, supports multiple SMP nodes and delivers the industry's best multicompiler price/performance. It supports up to 32 120-MHz PA-7200 processors and features 960-MB/second peak processor-memory bus bandwidth for maximum throughput.

Model EPS20 servers are bundled with HP's MC/System Environment, a comprehensive suite of system management tools and applications designed to optimize the system resources and ensure a single-system view.

The new HP 9000 C-class work-

stations are available in two configurations. The C100 is based on the 100-MHz, PA-7200 chip, and the C110 operates at 120 MHz. The systems include up to .5 GB of memory capacity, 6 GB of internal fast/wide SCSI-2 disk capacity, and three expansion slots.

The EPS20 also is based on a 120-MHz PA-7200 chip and supports up to 2 GB of system memory and 8 GB of internal fast/wide SCSI-2 disk per node.

### Mechanical CAD

HP has announced HP Precision Engineering (HP PE)/SolidDesigner 4.0, a 3D mechanical CAD system based on dynamic solid-modeling technology.

The enhanced system incorporates new dynamic-modeling capabilities, new facilities in free-form modeling, an integration kit for complementary application development, and HP PE/WorkManager for Workgroups for

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team-based concurrent design.

HP PE/SolidDesigner 4.0 includes more than 400 customer-requested enhancements. In addition, it includes quality enhancements in the areas of blending, taper, lift, layout, and ease of use.

The tool allows for reuse and modification of designs from other systems, independent of design history. Support of standards such as IGES, STEP, and ACIS SAT allows coexistence with other solutions.

HP PE/SolidDesigner 4.0 runs on HP 9000 Series 700 workstations and Silicon Graphics' Indy and Indigo2 workstations. Prices start at \$ 7,500.

### **UNIX 95 Brand**

HP has announced that the HP-UX 10.10 operating system is among the first UNIX systems to receive the X/Open Co. Limited's UNIX 95 (formerly known as SPEC 1170) brand.

The new HP-UX release also provides Common Desktop Environment (CDE) compliance and enhanced features and functionality for HP 9000 server and workstation customers in commercial and technical markets.

Major new features of HP-UX 10.10 include UNIX 95 brand; CDE compliance; Network File System (NFS) Diskless upgrade; increased maximum file system size, larger addressable RAM and larger process-data space; support for 60,000 file descriptors; increased system management capabilities; SMP support for HP VISUALIZE graphics; and Shared Logical Volume Manager (SLVM).

To receive the UNIX 95 brand, an operating system must pass an extensive test suite developed by X/Open and enter into a trademark license agreement, which guarantees the products' conformance to the Single UNIX Specification.

The UNIX 95 brand is the culmination of several years' effort, resulting in the development of X/Open Company's Single UNIX Specification (formerly known as SPEC 1170). This specification includes the most common APIs.

HP has increased the maximum file-system size of HP-UX 10.10 from 4 GB—the previous standard for 32-bit operating systems—to 128 GB for both hierarchical and journaled file systems. This enhancement greatly extends the scalability of HP-UX. HP also has increased the addressable RAM of HP-UX 10.10 from 2 GB to 3.75 GB. This increase provides greater flexibility for HP's high-end business servers and allows higher system performance by enabling a greater percentage of the application workload to reside in memory.

Both the increased maximum file system size and larger addressable RAM enable HP-UX 10.10 to outperform competing 32-bit operating systems from other UNIX system vendors, including Sun and IBM, in industry-standard benchmarks such as TPC-C.

A two-user license for the HP-UX 10.10 environment is bundled with HP 9000 workstations and servers, with additional license levels available. HP-UX 10.10 was expected to be available on February 20.

HP-UX 10.10 is binary-compatible with previous releases.

### **C, C++, and COBOL SoftBench**

HP has introduced C, C++, and COBOL SoftBench 5.0. These new SoftBench 5.0 suites, including SoftBench Configuration Management (SoftBench CM), an integrated, global code-management system, and C++ SoftBench CodeAdvisor, which provides rule-based code checking, now offer companies and

software developers the most complete development environment in the industry for creating open-systems applications.

SoftBench 5.0 includes a new Graphical Class Editor that enables users to create and manipulate C++ code easily and faster than before. It then automatically generates the new C++ code, making a thorough knowledge of C++ syntax unnecessary.

HP also introduced an integrated application-development toolset called COBOL SoftBench 5.0. Designed to help programmers make a cost-effective, smooth transition to an open-systems software-development environment, COBOL SoftBench 5.0 gives developers easy access to tools and common operating-system commands.

HP also introduced a new SoftBench Software Developer's Kit (SDK), which allows users to extend and customize SoftBench environments. The SoftBench SDK consists of three components: the existing SoftBench Encapsulator, the SoftBench Static Read API, and instructions for creating user-defined rules for C++ SoftBench CodeAdvisor. Using HP-developed Encapsulator technology makes it easy for developers to integrate their own or third-party software tools into the SoftBench environment.

SoftBench Suite pricing for HP-UX systems ranges from \$2,995 to \$8,995. ■

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*Attention vendors: New product announcements should be sent to New Products Editor, hp-ux/usr magazine, Interex, P.O. Box 3439, Sunnyvale, California 94088-3439, USA. Deadline for submission is 2-1/2 months prior to publication.*

*New Products refers to numerous products by their trade names. In most cases, these designations are claimed as trademarks or registered trademarks by their companies.*

# Midnight Lights '96

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### Helsinki-Stockholm-Tallinn

#### 10-12 June 1996

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Don't delay, register right away!



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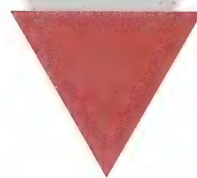
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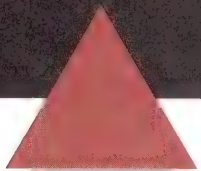
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**Membership Information.** Find out about the many services Interex offers.

# Visit Interex's Home Page: <http://www.interex.org/>

The pages are updated each Wednesday with  
important Hewlett-Packard related news.

Visit us often!



## *What are Interex Online Services?*

Anyone can access Interex's Web pages, but only Contributing Members who have purchased the "Online Service Package" can download programs from the Contributed Software Library, using a valid membership ID number. All other features of the Web pages are currently available to all members and non-members.

**The Online Service Package does more than connect you to the World Wide Web.** Additional services help you use the many specific Internet resources available to HP users. The package provides the following services:

- WWW access via Interex-provided PPP account
- E-mail account on our server (mbrnet.interex.org)
- Usenet News account on mbrnet.interex.org
- FTP services
- Shell account and 5 MB of disk storage on our server
- Ability to host your own home page on mbrnet.interex.org

These services vastly expand your ability to find timely and important information as well as communicate with the worldwide Hewlett-Packard user community.

Contributing Members with an "Online Service Package" can request software to set up and use the Online Services. A suite of applications gives you Windows-based graphical user environments. Seven applications are included in the The Software Set.

### **The Software Set**

**Trumpet Winsock**—Winsock and phone dialer. Used by the following applications to create your PPP connection to Interex's server.

**Trumpet Telnet**—Winsock client telnet application. Used to telnet to servers.

**Winsock-PING**—Winsock client PING. Used as a diagnostic program to send test packets to a known host on the Internet.

**WS\_FTP**—Winsock client File Transfer Protocol. Used to send and retrieve files.

**Pegasus for Windows**—Winsock client E-mail reader. Offline composer, reader, and archiving. Connects via PPP connection to send and retrieve mail.

**WinVN**—Winsock client news reader. Used for reading, posting, and archiving USENET News.

**NCSA Mosaic**—Winsock client World Wide Web browser. Used to access Interex's home page and other Web sites.

Interex Contributing Members receive the same services as members who purchased the "Online Service Package," with the following exceptions:

- They do not receive the Online Services Software setup disks. They must supply their own communications software.
- They do not have download access to the CSL.
- They access their services via a non-graphic "Terminal" connection instead of the graphic "PPP" connection.



To find out more about these services and the services available at your level of membership, please call and ask for Eric Park at 800.468.3739 ext. 622, or send e-mail to [park@interex.org](mailto:park@interex.org)





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### ■ online service package

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# and Service Package

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*Interact* magazine – includes companion Product Directory
- Subscription to InterexPress, monthly news publication
- E-Mail account through Interex (includes read-only access to Interex Online library)
- Access to Special Interest Groups (SIGs)
- Member rates for Interex Conferences
- Membership in your Regional User Group (RUG) at RUG membership rate
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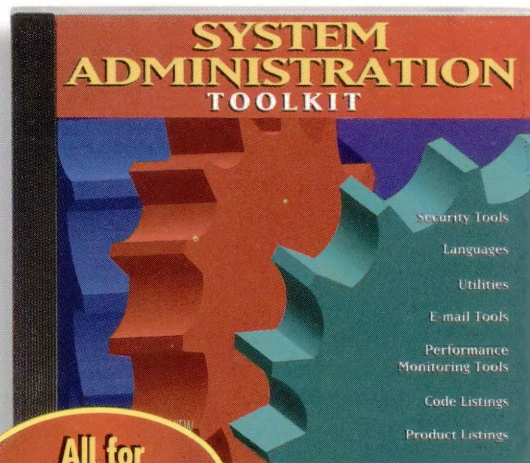
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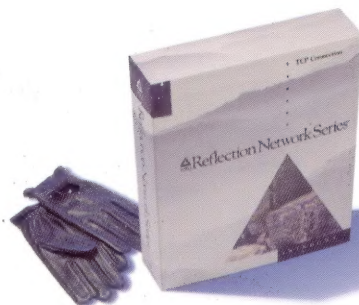
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